

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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## DP Centers Feel the Brunt of Hurricane's Fury



The wind-smashed second story of this Corpus Christi building housed a computer complex. (CW Photo by Thomas Morton)

By Thomas J. Morton

CW Staff Writer

**CORPUS CHRISTI, Texas**—When a hurricane is howling past the holes in the walls that used to be windows, a "crash" is more than just a memory loss—it's a car that used to be in the parking garage next door coming through the roof, a wall propped up by a tape drive, a 360/40 trying to float.

"Devastating," mumbled a man more to himself than to anyone else as he picked his way through the debris of Corpus Christi that included randomly sprinkled punched cards, and a full tape canister.

Hurricane Celia visited this south Texas city of an estimated 50 DP centers in the metropolitan area on Aug. 3.

The city saw her coming and tried to get ready for her. Windows were boarded up; businesses shut down, and people were evacuated from the town.

### Her Own Thoughts

But Celia had some thoughts of her own.

She waited out in the bay, whipping herself into a frenzy, then, good and angry, she entered the fray.

Most of the clocks in the town left recognizable were stopped at 4:46 p.m.

Nine hours later, she left, leaving behind an unbelievable havoc. "I'm wiped out," said Robert Millard, "just wiped out." He was standing in the wreckage of his office, his eyes were glazed and he looked like a

man about to weep.

"I don't know where anything is," he said looking about him at the shambles, at the broken glass and plaster and chewed up wood floating in the soup of three inches of muddy water on the floor. Punched cards were still floating in pools of water.

"I don't know what anything is," he said looking at a sopping mass of floating paper pulp that was once a computer printout.

Millard was in what was once his office on the 11th floor of a downtown office building.

Down what could have been once a hallway was the twisted mass of wall partitions, desks, furnishings, and ceiling beams. There was the smashed hull of what was once probably an NCR

(Continued on Page 2)

## N.H. City Says Printout Supports Its Challenge to Federal Census

By Edward J. Bride

CW Staff Writer

**MANCHESTER, N.H.**—Municipal tax rolls, annually validated by computer, are threatening to invalidate the 1970 federal census.

City officials claim that a complete printout of Manchester's

population will show at least a 10% error rate in the census, conducted in April by the U.S. Department of Commerce.

And city officials want their count accepted.

In the balance hangs hundreds of thousands of dollars in federal and state aid, and possibly half

of the state's representation in the House of Representatives, all of which depends on the correct number of residents.

City officials have requested meetings to reconcile the differences with the Department of Commerce, which conducts the decennial population count. The officials believe that Manchester is the only town in the state—if not in the nation—to have a complete computer printout to back up its challenge to the federal figures.

The Manchester population figures are compiled and updated annually by the IBM 360/30 computer, at the Merchants National Bank data processing center.

### Rate of 1,000

The bank computer showed the city's population growing at an annual rate of about 1,000, from 87,152 in 1960, to 96,722 this year. The federal count for 1970 was put at 87,343.

City officials are certain of their accuracy. They cite numerous cross-checks of the various computerized counts: drivers, spouse status, school children, veterans, elderly, and even whether or not a citizen is a dogowner.

Manchester officials used no "correction factors" in the figures, and are certain that the count, if not exact, is more accurate than the federal figures, according to a city spokesman.

At the Commerce Department regional census headquarters in Boston, director Arthur Dukakis indicated a desire to

interviewed felt that operator training was a problem while 17% (Continued on Page 4)



Control Data's 3170 Medium-Scale General Purpose System

## CDC 3170 Features Multiprogramming

By Frank Penta

CW Staff Writer

**MINNEAPOLIS**—A scaled-down version of the CDC 3300, introduced last week by Control Data Corp., features multiprogramming capability.

The CDC 3170, intended to compete with the IBM 360/40 and 48, the Burroughs B3500 and B4500 systems, the Honeywell 2200 and 3200, and the XDS Sigma 6, represents CDC's bid to bring to users some of the 3300's multiprogramming power into the price range occupied by the 3100 system.

A major feature of the 3170 is its compatibility, both on a hardware and software level, with the 3300 and 3500 CDC models. A 3170 user can upgrade his system to one of the more powerful systems. According to CDC, no one control card need be changed for 3170 software to run on the larger systems.

The 3170 is available in four models. The 3174-1 is the basic model. The 3174-2 is equipped with floating-point hardware. The 3174-3 features a business data processor, and the 3174-4 has both the floating-point and business hardware.

Each model is upgradeable to any appropriate higher-numbered model, and any model's memory can be field-expanded from 48K 24-bit words to 128K words. Maximum efficiency in the use of memory is assured, according to CDC, by dynamic core allocation with hardware memory protection, provided by a multiprogramming hardware module built into all models.

(Continued on Page 4)

## The Input Bottlenecks: Bane of DP Managers

By Michael Merritt

CW Staff Writer

**NEWTONVILLE, Mass.**—Are input problems plaguing your installation? Cheer up, you're not alone.

Responses from 1,647 DP centers around the country to a recent CW survey show that 45% of DP managers are experiencing serious input bottlenecks, and two-thirds feel that input is a greater problem than output.

Among the solutions to the

input problems, the DP managers most often mention tape data capture (23%) with on-line operation a close second (21%). The users also offered the following solutions: OCR devices (15%); better hardware in general (13%); better systems approach (9%); and more standardized operation and better forms (6%). Better training programs were mentioned as a solution by 6%.

### Key-to-Tape

Only 4% felt that more key-to-tape devices would offer some relief from the problems of input. Only 3% felt that "Buck Rogers" approaches such as direct voice input would aid in clearing out the input bottleneck.

Human error seems to be the problem associated most with users' data capture operations with 82% of the installations interviewed mentioning it as a serious problem.

Thirty percent of those interviewed felt that operator training was a problem while 17% (Continued on Page 4)

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## Arm Tracks Down Its 'Missing' Data Bank

By Joseph Hendon

CW Staff Writer  
WASHINGTON, D.C. — A red-faced Army admitted last week that it did not know where its own computer data banks were, and that it had just found another data bank of information on lawful civilian political activity.

Meanwhile, the Army also announced a new policy on collection of such data. But Sen. Sam J. Ervin (D-N.C.) accused the Army of doubletalk, and said that the new policy appears to be the same as the old.

The computerized data bank was found after an official Army data bank hunt. Last spring, after a flurry of protests, the Army discontinued use of two computerized data banks on law (u) civilian political activity, keeping only one at the Pentagon (CW, May 9). Critics were angered by the Army that data collection had been sharply reduced and that there were no other data banks.

To prove that there were no other data banks, the Army conducted a survey asking intelligence unit commanders to report on any computerized data bank maintained for civil disturbance purposes.

To the apparent surprise of the Army, the data bank hunt turned up a computer data bank at Fort Hood, Texas. No other information on the data bank was released by the Army, who says only that all punch cards and tapes and all but one copy of the printout have been destroyed.

The remaining copy of the printout has been turned over to the Internal Security Division of the Justice Department. According to the Army, this was done because of the current American Civil Liberties Union case against the Army data banks.

But an aide of Ervin, an outspoken critic of the Army data banks, noted that if the printout were being retained only for purposes of the suit, the most reasonable thing would have been to give it either to the judge handling the case or the branch of the Justice Department defending the Army in the suit.

Instead, the aide said, the printout was given to the Internal Security Division, which has nothing to do with the court case, but which is setting up its own computerized data bank of similar material.

## 'Domestic War Room'

The main Army repository for information on civilians is the Counterintelligence Analysis Division (Clad) computer-aided microfilm data bank. The data bank is in the new "Domestic War Room," built under the Pentagon parking lot at a cost of \$2.7 million.

Such data is needed, according to the Army, because such persons and groups might be involved in civil disturbances serious enough to require troops.

## New Army Policy

In addition to "finding" another data bank, the Army has issued a new policy directive on

collection, reporting, and storage of information on civilian political activity. The directive was issued May 25 by the Acting Adjutant General, Col. Robert E. Lynch, and released last week.

Ervin was highly critical of the directive, however, charging that it contained many inconsistencies. "In some cases, the last half of his [Lynch's] sentences seem to cancel out the first half of his sentences," Ervin declared.

Ervin noted that the directive stated that under no circumstances will the Army "acquire, report, process, or store civil disturbance information on civilian individuals or organizations whose activities cannot, in a reasonably direct manner, be related to a distinct threat of civil disturbance exceeding the law enforcement capabilities of local and state authorities, except as authorized in paragraphs 8 and 9d."

But paragraph 9d, Ervin noted, appears to nullify completely this restriction. That paragraph allows spot reports of civil disturbances which "may contain names of individuals or organizations that were directly involved in the civil disturbance being reported."

Elsewhere in the directive, a "civil disturbance" is defined as a "situation in which a civil jurisdiction is required to apply a greater than usual degree of law enforcement to maintain law and order."

Ervin commented: "This, it might be presumed, could in-

clude the assignment of one more police officer than usual when there is a football game in town."

## 'Deterrent Power'

Ervin concluded, "From the [Army's] latest policy statement, it is clear that the Army has maintained its deterrent power over the individual rights of American citizens."

The Army's computerized data banks on civilians are "part of a vast network of intelligence-oriented systems which are being developed widely throughout our land by government and private industries," Ervin declared. Some of these systems "contain the record of the individual's thoughts, beliefs, habits, attitudes, and personal activities (and contain) a potential for political control and for intimidation which is alien to a society of free men."

## Justice Taking Over?

Ervin also noted that the Lynch directive represented a change of policy in which some of the "surveillance and certain data collection which the Army has been performing on civilians" will be taken over by the Justice Department, which is setting up computerized systems to handle such information.

This new policy represents, according to Ervin, "an obvious surrender by the Justice Department in that it has agreed to engage in a program which, according to previous reports, it has refused to undertake until now."

## DP Centers Feel Brunt of Celia's Rampage in Texas

(Continued from Page 1)

IBM fortunately didn't have a computer on "showcase" display in Corpus Christi as it sometimes does in other cities.

## Power Problem

The big problem was power — there was none.

The IBM 360/40 at Central Power and Light wasn't "damaged" but the center had been flooded, and the company had no idea of how much trouble the high humidity had caused.

There was no power to get on the air.

It was that way all over town — no power.

Only one 69 kV transmission line bringing in power was still up, and feeder lines from the distribution stations were a hit-and-miss affair.

"It was only a guess as to which feeders were still working," a CP&L man said at distributing stations, "and if we find feeders still up, we find the transformers smashed by flying debris."

## On Duty

Downing was on duty in the ruined lobby of his building, stopping people from going upstairs.

"It just wasn't safe," he said. The debris could have shifted causing the computers to slide right out of the building into the roof of a small bank next door.

The IBM building took a licking. The big plate glass window in front of its 1050 terminal was blown in, and water, mud, glass and window framing had smashed into the room.

HEB Foods is using the computer to keep its food inventory moving to stores still operating.

"Without the computer," Butt said, "our warehouse programs would have been delayed."

This would have seriously hindered getting food to the people.

"Now above all we have to get that food out," he said.

It will be days before people will begin to know the damage, weeks before full power is restored, and it will be months before normalcy even begins to return to the Corpus Christi metropolitan area.

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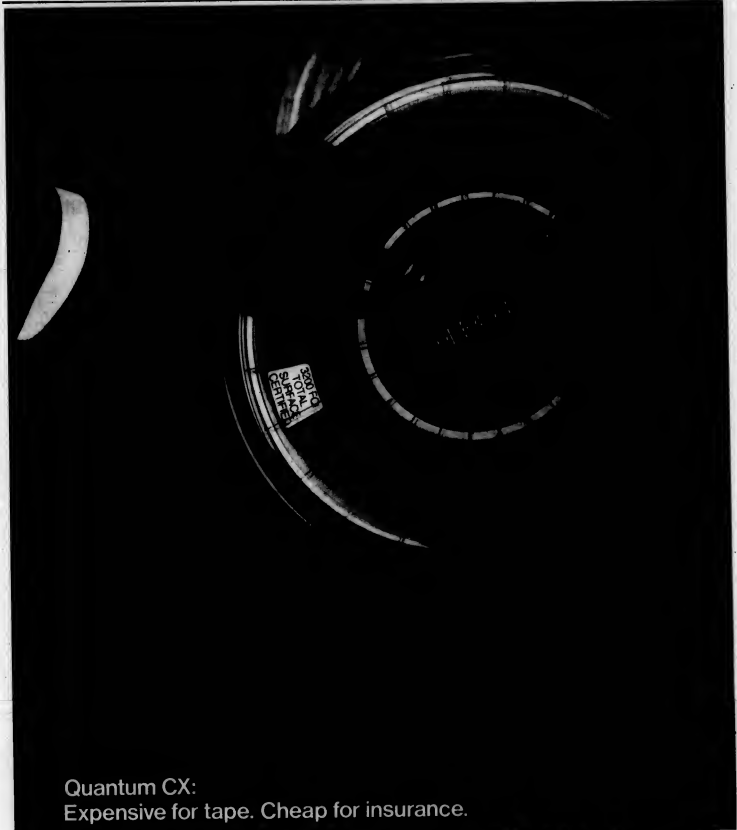
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A 1050 terminal in the damaged Corpus Christi IBM building was cooled by the driving rain and struck by flying debris. (CW Photo by Thomas Morton)



## Quantum CX: Expensive for tape. Cheap for insurance.

At this very moment, the critical data in your tape files may be deteriorating. Until Memorex Quantum came along, there wasn't much you could do about it. Now there's Quantum CX. It protects against lost data two ways.

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It costs more to make a tape the way Quantum CX is made, so it'll cost you a little more to buy. But remember, the premium you pay really isn't for the tape. It's for the insurance.

For more information on Quantum CX, write: Memorex Corporation, Information Media Group, Memorex Park, Santa Clara, California 95050.

# MEMOREX

# Detroit Is Singing the Computerized Vote Count Blues

By Edward J. Bride

CW Staff Writer

**DETROIT**—For George Edwards, it was a matter of subtracting 1,111 votes from a candidate's total, or sitting around for "three or four hours," trying to figure out what was wrong with the program.

The Detroit city clerk decided on the latter, and finally determined that a flaw giving one primary election candidate one extra vote per precinct was caused by "a punch error in the duplicating process in the test deck."

Last week's statewide primary election was the scene of this modified failure of computerized vote counting, which only days prior had been given a clean bill of health by local citizens, candidates, and government officials.

Modified or not, the failure portends little good for the

Votomatic, since an error of 1,111 votes, one for each precinct, is about 1,111 more than most citizens would tolerate.

A hotly contested Republican senatorial nomination was one of the races at stake, and Lenore (wife of George, former governor) Romney and opponent Robert Huber were separated by less than 1% of the 220,000-vote tally, in early returns.

## Recommendations

Edwards commented that all recommendations to preserve the integrity of computerized vote counts, as determined by a Los Angeles panel last winter, were implemented in Detroit.

He indicated that this type of error was not included in the comprehensive Los Angeles report, which presumed to cover all possible instances of fraud or error.

The city clerk said that the

original test deck used in accuracy tests counted perfectly on its machine, but that the other five computers, in the other counting centers, each added one vote for just one candidate, for each precinct.

He claimed he declined the simple solution, subtracting the appropriate votes, because "that would call into question the integrity of the whole process."

The problem was finally uncovered when Edwards carried

the original test deck from its installation to another counting center, and it counted perfectly. The second installation was then started up, and the original test deck carried to a third installation. Ditto the results.

By this time, after starting up the third counting center, Edwards said it was five or six in the morning (Aug. 5), and the other three installations were voided.

Full operation was resumed

around 9 a.m. in the three centers, plus the summary counting center at the City-County Building.

Edwards has called for a full-scale investigation into the cause of the failure, not knowing if it was equipment or personnel that malfunctioned.

"Personally, I am absolutely convinced [it] was a mishap in the duplicating process of the test deck," however that happened.

## CDC 3170 Features Multiprogramming

(Continued from Page 1)

The optional business data processor directly executes variable-field length business data processing instructions, resulting in, CDC said, increased efficiency in the handling of business applications. Instructions in-

clude file searches, moves, editing operations, binary to BCD conversions, and numeric and variable 64-character BCD com-

Performance of the 3170 will probably be on a par with the 3100. It has a memory cycle time of 1.75  $\mu$ sec/word and an access time of 1.0  $\mu$ sec/word. A word can contain four BCD characters or 24 binary digits. Address modification and indirect addressing are implemented.

Multiprogramming is an integral element of each 3170 processor and provides interleaved or "paged" execution of instructions from several programs under simultaneous control of the Master operating system. Because company memory is divided into 2K-word pages, half-page and quarter-page units, individual users can place their programs on pages and segments regardless of location through core storage.

All of the software available

with the 3300 and 3500 systems is available for use with the 3170. Master uses dynamic program relocation and protection features of the system to perform continuous processing of up to seven user programs in up to 131K-word storage.

Two, four or six data channels—the 3172-2, -4, or -6—can be connected to the 3170. Each data channel provides a simultaneously buffered input and output for up to eight peripheral controllers.

A typical 3170 configuration including 98K words of core memory, the 3174-3 business processor, a channel module with two 12-bit, and two 24-bit channels and control, three multiple disk storage units, card reader and control, line printer and control, four magnetic tapes and control, and a multiplexer and control would sell for \$870,300 and lease on a one-year basis, for \$119,160/mo.

The CDC 3170 is currently available on a 120-day delivery schedule.

Model	CDC 3170	IBM System 360/50	Honeywell Series 200 3200	XDS Sigma 6
Cycle Time	438 nsec/char	250 nsec/byte	500 nsec/char	300 nsec/byte
Core	196K 131K char	131K 131K char	131K 131K char	131K 131K char
Random Access Storage	24.6 million char	29 million bytes	27.6 million char	24.5 million bytes
Card Reader (card/min)	1,200	1,000	1,050	1,500
Card Punch (card/min)	250	300	106-400	300
Printer (lines/min)	1,000	1,100	950	1,000
Mag Tape (char/sec)	4 @ 60K	4 @ 60K	4 @ 64K	4 @ 60K
Unit Rental	\$13,490	\$19,452	\$18,970	\$14,132

A comparison of typical configurations of the CDC 3170 and three of its principal competitors in the medium-priced computer system field.

## Human Error Cited as Main Data Capture Problem

(Continued from Page 1)

mentioned equipment performance headaches.

Other problems, including the need for better systems approaches, need for management confidence, and the need for more user education, were mentioned by 18% of the sites interviewed.

The mean monthly expense for data capture hardware reported by the survey participants was \$21,000, while the median was \$900, showing the distorting effect of a few, very high-priced units.

The largest expenses occurred

in banking, communications, and utilities, while the lowest were associated with trade, printing and publishing, and manufacturing organizations and hospitals.

## Increase Seen

Over half—53%—of the DP managers expected their data capture costs to increase in the next five years, while 17% expected a decrease and 30% saw it remaining steady.

Only 13% of those surveyed are presently implementing some form of data capture with plans to begin a data capture

program. The remaining 55% have no plans in the area.

The major advantages seen with non-teyp equipment by the installations include the speed of data preparation and transmission, the reduction of error, and improved economics in the data gathering operation.

Most of the users said they experienced improved efficiency with non-teyp equipment for data capturing operations. In addition, they felt that the elimination of intermediary operations was a plus factor when using equipment other than keypunches.

## City Says Printout Challenges Census

(Continued from Page 1)

deadline, Dec. 1.

An assistant also suggested that the population differences might be resolved by checking into "what definition was used for 'city residents'?"

Manchester City Tax Assessor John McGranahan charged that

the federal count actually missed more than 12,000 persons.

Eye of this political-social storm is the absence of sales and income taxes in the state. Towns raise some money by imposing poll taxes and head taxes, at a "per person" rate of \$2 and \$5, respectively. This revenue is

therefore closely tied to the number of local residents. The accuracy of the figures, then, is of utmost importance.

"Nationwide"

The challenge is not strictly local, according to N.I.I.'s U.S. Rep. Louis C. Wyman. He is asking the Commerce Department for a "thorough review," charging the problem is "nationwide."

Wyman added, "If any major difference is found, it should be resolved in favor of Manchester."

It may also be in favor of New Hampshire, which could feasibly become the fifth state to have only one representative in the House, under the new one-man, one-vote rules.

Congressional reapportionment will depend on the results of this census, and if the lower federal figures are accepted, and if other states show marked increases, then New Hampshire could lose one of its two seats.

With other municipalities reportedly questioning the 1970 census, confusion may await reapportionment plans if Congress, to say nothing of federal grants-in-aid programs.

There is also the minor issue of status, in this case. If local officials prevail, the city would rank ninth among New England cities if the federal count is used, it would fall behind Lowell, Mass., into tenth place.



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## Computer a Scapegoat?

## Fair Credit Bill Would Protect Against False Billing

By Joseph Haddon  
CW Staff Writer

WASHINGTON, D.C. — Credit card companies "are hiding behind their computers" and are "making handsome profits off of bad billing practices," charged Sen. William Proxmire (D-Wis.) in introducing a bill to protect consumers against careless and erroneous computerized billing. The bill would put "responsibility" for computer "mistakes where it really belongs — with the credit card companies," Proxmire declared. Such legislation is the only way to force companies to improve their computer systems, he said.

Correcting "a computer mis-billing can turn into an unbelievable nightmare of lost due notices, calls from collection agencies... and threats of bad credit ratings," Proxmire said.

## Scapegoat

But computer systems may be only a scapegoat. Some companies have too few people to answer the flood of complaints, he said, yet all blame is placed on the computer.

Called the Fair Credit Billing Bill (S-4108), the Proxmire bill has been referred to the Senate Banking and Currency Committee. No hearings have been scheduled.

## Company Must Respond

Under the bill, a creditor must acknowledge receipt of a consumer complaint within 10 days; within 60 days, the creditor must send a corrected statement or explain why the original statement was correct.

## IBM, GE Get Safeguard Contracts; Both Represented on ABM Panel

WASHINGTON, D.C. — Two companies represented on the Safeguard ABM advisory panel received large Safeguard contracts last week.

IBM received a \$22 million contract and General Electric a \$10.8 million contract. Both are subcontracts from Western Electric Co.

IBM and GE both have representatives on the National Academy of Sciences Advisory Committee on Data Processing for Anti-Ballistic Missile (ABM) Defense.

Last week, CW reported that a majority of the committee mem-

## Computer Prints Your Summons

Computer-printed dunning letters are now old hat. One New York company has its billing computer automatically print a civil court summons if the customer does not pay his bill, according to State Attorney General Louis J. Lefkowitz.

In some cases, he said, customers who had written to the company protesting an error only received more computer bills and finally the computer-printed summons.

In New York State, a creditor can serve a civil court summons requiring court appearance without prior approval from the court. The only requirements are that the court be given a copy, and that the summons be served by hand.

"The letter requirement is often ignored, a procedure known as 'sewer service,'" A spokesman for Lefkowitz said that in some cases the debtor never got his copy of the computer-printed summons and found out about it only after the court issued a default judgment against him.

Once served with the summons or default judgment, the consumer must get a lawyer to defend him in court against a claim that may be solely due to a computer error, Lefkowitz said.

To fight this problem, Lefkowitz announced last week that he would introduce a bill similar to Proxmire's Fair Credit Billing Bill to control computerized billing.

Creditors who failed to respond would forfeit the right to collect the bill. If the consumer could prove that there was an error and it had caused him damage, the creditor would be liable for treble damages and the consumer's attorney fees.

Creditors would be required to notify consumers of their rights as part of each monthly statement.

The bill also would attack what Proxmire called "the shrinking billing period," the practice of some creditors "who send periodic billing statements to consumers a few days before or even after the payment due date, [causing] the placing of

'unfair finance charges on the consumer's account,'" Proxmire said.

Under this provision of the bill, companies would be required to mail statements 21 days prior to the due date.

## 'Severe Harassment'

"Those of us who have been faced with a computerized billing error know that while the consumer is in the right and not legally responsible, he is still 'subject to severe harassment,'" Proxmire said. "It is fair for the consumers to have to pay for the errors of the company?"

"If the computer system is at fault, we have the technology to correct the system," Proxmire continued. "I think the consumer has the right to demand that companies improve their computer systems."

"Another possible explanation is that the managements of these companies are hiding behind their computers. They might be unwilling to employ additional

staff to handle the large volume of complaints.

For example, one large credit card company receives over 40,000 inquiries a week from its customers and admits it is running far behind in answering this mail. Errors are "explained away" as computer errors, Proxmire continued.

## Errors Intentional?

"After months of fighting, many customers give up and pay the amount in dispute rather than risk destroying their credit rating or continue a tiring and expensive campaign of phone calls, letters, and telegrams. Why should the companies want to change their bad billing practices when they might be making a handsome profit off of them?" he asked.

Rep. Cornelius E. Gallagher (D-N.J.) introduced two measures in the House (HR 16266 and HR 16267) in March that are somewhat similar to

Proxmire's bill.

A spokesman for Proxmire said that Gallagher's bills are harder on creditors, making them forfeit all liabilities of a consumer if they have not responded to a notice from the individual that there is an error in his account.

Gallagher's measures also provide for fining creditors who report an account delinquent to credit bureaus when the individual has notified the creditor that his account is in fact in error.

The Senate this year passed two other Proxmire bills in this area. The Fair Credit Reporting Act (S-823) would restrict the actions of credit bureaus and insurance investigating agencies. A stronger version of this bill will probably be reported by the House Banking and Currency Committee later this year.

The second Proxmire bill (S-721) would prohibit the unsolicited mailing of credit cards.

## Turkey Breeding Gets a Big Boost

OKDALE, Calif. — A company at Williams Turkey Breeding Farms, Inc., is helping scientists breed turkeys that will wind up at dinner tables on three continents.

With the assistance of an IBM 1130 system, Williams researchers are able to select parent turkeys that will produce poults with specific desirable characteristics.

The company keeps computer records on every breeder bird, dating back five and six generations, and notes its characteristics. This allows experts to mate certain birds and predict the attributes of the offspring.

To assure economical egg production, the company maintains computerized records on each flock. When production begins to falter — usually after 20-26

weeks of laying — the turkeys are processed for the table.

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# Most of Auctioned Hardware Rebought by Consignors

By Harvey Elman  
CW Staff Writer

NEW YORK — Most of the \$269,000 worth of used computer equipment auctioned off at the recent Parke-Bernet auction ended up right back in the hands of the people who consigned it to the gallery for sale.

Not only were approximately 20% of the lots passed over, but more than two-thirds of the total sales represented automatic buy-backs.

Stuart Rubinstein, president of IOA Data Corp., New York, said he bought back approximately 60% of his consignments, totaling close to \$180,000. Forty-three of the 93 lots in the auction belonged to IOA. "The bidding failed to reach the upset price, so the auctioneer just

bought them back for us," he said.

Rubinstein also indicated that he would lean favorably toward consigning large lots of equipment at any future auctions.

An IBM 360/20 12K card system was repurchased by IOA Data for \$52,500, as well as a 4K system for \$29,000. "Most of the other large systems were also sold back to their consignors with a 15% commission to Parke-Bernet," according to Martin Stansfield of Parke-Bernet.

Joseph Kirby of Time Brokers, Inc., who originated the idea of a computer auction, felt that "the computer industry just isn't sophisticated enough to take the time to acquire any background

information on the equipment. Only about 10% did any homework." This factor, he maintained, was a major reason why the auction was not "the screaming success we had hoped for."

"When you buy a computer at an auction," noted Stansfield, "that's what you get, a computer—no auxiliary services such as installation and maintenance. That was one big omission. Also, reserve bids should be published in a catalog which comes out six weeks in advance, not two. People would know the knockdown figure and the bidding would start from there."

Meanwhile, another company has announced plans to set up a permanent trade center for auctioning used computer equip-

ment. Standard Prudential Corp., a holding company that is quietly folding its huge fur auction house in New York City, said it plans to convert its fur auction into a computer auction.

Commenting on this announcement, Stansfield theorized that the computer industry "may have to see the equipment on-site like a supermarket."

In addition to conducting periodic auctions of used computer equipment supplied by owners and brokers, Theodore Silber, company chairman, said the new Computer Trade Center would sell at retail as well as at upset prices and by "private treaty negotiations." The center will hold the equipment in trust pending sale, for the benefit of sellers.

## Two Arrested in Threat To Destroy N.Y. DP Center

NEW YORK — New York City detectives arrested Robert Wolfe, a nonuniversity assistant history professor at New York University, and Nicholas Unger, a former physics teaching aide at the university, on charges stemming from an alleged threat to destroy the computer center at the university's Washington Square campus if a demanded \$100,000 was not paid.

The threat was allegedly made by telegram, received at the university last May 6, the day after 150 students seized the university's Courant Institute of Mathematical Sciences.

The telegram allegedly stated that the computer complex would be destroyed if the demand was not met. The time limit set in the alleged threat, according to an official at the institute, was 11 a.m., May 7. According to reports, the university's president, James M. Hester, did not receive the threatening telegram until just a few hours before the deadline.

### Gasoline

When the building was released by the students, police and university officials entered and found a gasoline-soaked fuse leading to a can of what is believed to be alcohol in the \$3.5 million computer complex. The two men, indicted by a New York Grand Jury for conspiracy, attempted grand larceny by extortion, and attempted coercion, wanted the \$100,000 for bail for a member of the 13 Black Panthers facing trial here on bomb conspiracy charges, according to District Attorney Frank S. Hogan.

The specific Black Panther involved was not named. Both men are white, a representative of the district attorney's office said.

Wolfe was freed on his own recognizance. Bail was set at \$5,000 for Unger. Trial will be held in Supreme Court, County of New York. If convicted, Unger and Wolfe face a sentence of seven years, plus fines, the district attorney's office stated.

### IRS Has Money Problems

WASHINGTON, D.C. — The General Services Administration (GSA) said that the Internal Revenue Service Computer Service Centers planned for Fresno, Calif., Suffolk County, N.Y., and Memphis, Tenn., are running into money problems.

GSA officials will soon ask Congress for permission to raise the annual sum it will pay private lessors to build the three proposed centers and lease them to GSA, the government's landlord agency.

## The IBM 2314 is a slower, more expensive replacement for a CDS 114/1014 disk storage system.

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## Used Computer, Anyone?

# Availability of IBM 2d Generation Machines Detailed

By Michael Merritt

CW Staff Writer

Both demand and supply determine the price of a used computer.

While it seems hard right now to get a handle on the demand for second generation computer, it is possible to say something about supply.

Using data supplied by the International Data Corp., a major computer industry information service organization, CW has been able to estimate the number of second generation IBM machines that are available for a second-hand market.

In the 1400 series there are 1,750 to 2,000 1401s, 1401Gs and 1401Hs in non-IBM hands, while there are 500 to 700 1410s, 1440s, and 1460s.

Adding together the 7010, 7040, 7070, 7074, 7080, 7094,

and the 7094-II there are 400-500 large second generation IBM machines potentially available. At the other end of the spectrum there are 600 to 750 1130s around.

These figures are the number of machines that have been purchased from IBM either by users or third party leasing companies. They do not, of course, reflect the number of machines for sale at any one time, any more than the fact that Chevrolet sold two million cars in 1967 means that there are two million '67 Chevrolets for sale.

Like used cars, though, a certain percentage of them will be sold each year, and a certain percentage scrapped.

As long as there is a market for the used machines, the discard rate will be low; and assuming there will be no third hand

market perturbations and that the second generation machines are released from their present sites evenly over the next five years; there conceivably will be 350 1401s coming onto the market per year, 100 of the 1410 series, 80 of the 70 series, and 120 1130s.

### IBM's Role

Unlike the used car business, though, when a user trades in an IBM machine to IBM, it doesn't go on the market.

According to the terms of the 1956 consent decree, IBM has to sell returned purchased machines at a specified price, depending on the age of the machine, to any qualified buyer.

If more than one buyer says he wants the machine, IBM apparently pulls a name out of a hat.

A spokesman for IBM said that there are very few machines that IBM sells in this manner, probably less than two dozen computers a year. IBM will send notice of these sales to anyone interested, he noted.

The IBM spokesman also said that since there is a market for used machines, the only people who return purchased computers are generally getting rid of

worthless machines.

Returned leased machines, on the other hand, fall into the great gray mass of IBM, where they are either reconditioned and sold or re-leased, scrapped, or shipped out of the country.

This is why the availability figures are based on machines in non-IBM hands, since they will no doubt escape the great gray mass.

## Florida's 'Phase One Consolidation' Seen Eliminating 17 Computers Used by State

By Edward J. Bride

CW Staff Writer

TALLAHASSEE, Fla.—Two management steps are being taken to save the state nearly \$1 million annually, and some computer companies may not be too happy about one of them.

The first step was authorized by the state legislature last year, and involves reducing the number of computers owned or leased by the state from 35 to 18.

The other step, according to the state's data processing chief, involves consolidating the records and payroll of about a hundred employees of the Division of Electronic Data Processing.

Both steps are part of the "Phase One Consolidation" passed by state legislature, stated William Corbett, director of the EDP Division.

He estimated that the hardware cutback would account for most of the savings, and noted that long-range benefits would include better utilization of re-

maining DP equipment.

Corbett said "only a few management jobs" would be eliminated when the state establishes nine data centers, plus another seven autonomous centers at state universities this month.

Two state centers will have two computers each, making the total 18 to be operated by the state.

Most of the equipment returned will be leased, second generation hardware, but Corbett said that one IBM 360/20 and one 360/30 would be included.

At least one 360/50 will be retained.

### Five Industry Leaders

While noting that IBM is well represented among the existing, and remaining hardware, Corbett stated that five of the leading manufacturers were represented in the state's computer assortment.

The manufacturers include Control Data, Honeywell, RCA, Burroughs, and IBM.

The data centers will be operated by the EDP division, under the Department of General Services, which consists of the governor and the cabinet.

Corbett's EDP is one of seven divisions, with Purchasing, and Building Construction and Maintenance among the others.

There are 23 agencies of Florida government, and almost all will be served by one data center. Eight of the centers will be located here, with the other in Jacksonville.

The centers will operate on two shifts, leaving the flexibility to expand to a 24-hour operation if the need develops.

Also planned are an OCR center and a micromation center, which will go before the legislature for approval this year.

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## Computers at Expo '70—Part II

## Countless 'Show' Applications Are One Big Happening

By Bernice Pantell

Special to Computerworld

**TOKYO**—In a way, Expo '70 is one big computer. There is a computer to synchronize psychedelic light shows; a computer to compose music and design clothes; a computer to fly a plane; by even a computer to soothe your jangled nerves by.

There are over 80 computers installed in the pavilions. Some are used by exhibitors to demonstrate technology and some are behind the scenes, unsuspected by the crowds of people being subjected to the most vivid and overpowering images and sounds that man has been able to invent.

These shows are the most characteristic feature of Expo '70. They synchronize light, sound and film into "total expe-

riences" which simply cannot be described. They have invented new colors, produced new sounds and surrounded all with wild films—not just all the way around but overhead and underneath too. The exquisite timing of the equipment that produces these experiences is controlled by computer. It is literally no other way to do it.

It is just one, big happening and you are never again the same. And you like it and keep going back for more!

## Awareness of Needs

The computers on display are amusing and informative, and again they reflect an awareness of the needs of individuals in this complex world.

The Furukawa Group put together an exhibit called "Computopia" to demon-

strate how computers will be used in the future, using techniques that appeal to young people without overpowering them.

The Group has a dress design application called the Computer Dress Designer that attracts young ladies like bees to honey.

The girls, mark-sense an input form without realizing it. The form is large, colorful and artistic. They choose a favorite hairstyle, a favorite pattern and a favorite color from samples on the form. This goes through an optical mark reader and in a few seconds their personally designed dress prints out of a printer that is imbedded in the wall in front of them.—It appears to be emerging through a slit in the wall.

The printout shows a smartly dressed

young woman in a smashing outfit, beneath which is printed the girl's name, age, and a description of her fashion "type." There are some 320 types programmed into the computer and the girls giggle with delight as they compare styles.

There are a half-dozen other computer games going on in Computopia, using voiceprints, computer-composed music, and other new techniques. The exhibit is built around four Fujitsu 270/30 computers with magnetic tape drives and drum storage.

These are 262K machines, programmed in Cobol, Fortran, Assembly Language and Fasp, all in English versions. Twenty programmers worked two years to put together the entire package.

## IBM Exhibit

IBM has an equally varied exhibit. It is less sophisticated than the show at the New York Fair but seems to be well-suited to the interests of the visitors.

IBM's theme is "Man the Problem Solver" which it stages with the help of a 360/50 using disk, remote terminals, voice I/O and graphic display units.

The two devices IBM is most proud of at Expo are the audio voice communicator and the new kanji printer which can print 4,000 kanji characters.

The audio voice communicator lures the visitors to the IBM pavilion. They tell the computer their birthday and the computer tells them how old, they are and describes an important historical event that occurred the day they were born.

The machine that creates kanji input is a sort of weird keypunch unit that produces cards or CRT display.

The operator selects kanji characters with a steel stylus and a sliding key.

It seems to be slower than punching, but each kanji character is at least a word and often an expression, rather than a letter or number, so effectively it is not slow at all.

Even though it looks awkward, IBM considers it a major breakthrough for data processing in Japanese.

## Most Outstanding

The most outstanding man-computer exhibit is in the Sumitomo pavilion, where a Neac 2200 computer scans a visitor's face, prints out his image and gives him a personality analysis by voice feedback, usually comparing him to some famous person.

Everyone takes home a picture of himself printed on a computer before his very eyes—it is Expo's most impressive souvenir.

The Neac 2200, manufactured by Nippon Electric Co., is a 32K word machine with conventional tape and drum storage and unconventional image input and output devices.

Forty men worked together in the engineering department of Kyoto University to develop the techniques of pattern recognition and portrait printing which they demonstrate in this exhibit, calling it Image Information Processing.

These are only some of the innumerable examples of the use of computers at Expo '70. Few of the visitors appreciate the techniques used and the technological advances some of them represent.

## World of Future

But they are willing to interact with the machines, they are delighted with the results and they seem quite ready to accept the use of such devices in their world of the future. This is a credit to the hundreds of computer professionals who planned well, with human nature in mind, who rejected mediocrity, and who labored for thousands of man-months to produce excellence. It's a job well done and an exposition worth seeing.

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## 'Lack of Foresight'

## Official Raises New Charges in DP Consulting Dispute

By Edward J. Bride  
CW Staff Writer

PITTSBURGH—Charges of lack of foresight and possible duplicity of motives have been leveled against county officials by Commissioner William R. Hunt, a recent foe of at least one computer consulting company.

this time as a "third party."

Hunt recently criticized MPC Corp. for alleged overpricing and irrelevant consulting in a three-year contract with John J. Kane Hospital, which is operated here by Allegheny County (CW, July 23).

Now, the commissioner is attacking Thomas R. Jordan, director of the county's Bureau of

Systems and Computer Services.

Jordan's office was created in January, about three months after specifications for computerization of all county operations were written by Westinghouse Information Systems Laboratories (WISL).

Jordan said these specifications were not sophisticated, not attuned to the "high gear" in

which he would like to see the county operating. He wants the opened bids thrown out, and the specifications rewritten.

Hunt charges that Jordan should have seen this months ago, not just in June when it appeared that RCA was the responsible bidder.

A spokesman for the commissioner suggested a duplicity of motives in certain county officials, noting that at least two employees in Jordan's bureau were IBM-trained, and another "might have been refused" a job by RCA.

The spokesman also asked: "Why are we paying an outlandish fee for consultants, if we aren't going to listen to them?"

Contract Expanded in April  
WISL has since reorganized,

and the consulting is now performed by the Public Systems Management Services (PSMS) group of Westinghouse's Civil Systems Division. Its \$200,000 one-year contract was expanded to \$500,000 in April.

A PSMS spokesman said that, at any time, from nine to 25 people might be working on the Allegheny County project, although he did not have an estimate as to the cost of rewriting the specifications.

He did not say the RCA bid, for a Spectra 70/45 at around \$15,000 per month, meets the specifications. IBM was the next lowest bidder, at \$17,500 per month for a 360/40.

NCR and Control Data were technically eliminated because they did not meet specifications, in that component timers were included in software, rather than hardware.

#### 'Ambiguous' Specifications

Jordan claimed that there were certain "ambiguous aspects" to the specifications, adding it would be "pretty tough" to eliminate a vendor because of a timer.

Jordan also claimed that the current specifications would suffice for only three or four months, and that Westinghouse should also take that position.

He called on the company to state its stand on his opinion, that "there would have to be an immediate update" if the current bids were accepted.

Ultimate decision will rest with the county commissioners. Hunt, a Democrat, is minority member of the triumvirate, although none are up for reelection this year.

Jordan, in commenting on the current controversy, said he would like the commissioners to authorize resubmission of the bids. "I'd like to square things away now," Jordan said, "and it's up to Westinghouse to help."

## Computer Lends a Hand To Farmers in 16 States

ST. PAUL, Minn. Four thousand farmers in 16 states are managing their farms better because of a computer here.

The Federal Intermediate Credit Bank (FICB) of St. Paul uses a computer to analyze spending and earning trends of the farmers. Based on the reports, farmers quickly can determine their most profitable crops and evaluate ways of improving fattening operations.

FICB uses financial information supplied by the farmers to process their loan requests more rapidly.

Andrew Lampen, credit bank president, said: "As farms become larger, managing them becomes more difficult. To grow a farmer needs capital, which we supply. But they also need accurate record-keeping systems to spend that capital wisely."

Today's computerized farmer can't afford to keep records on slips of paper. We are giving him accurately kept computer records of the hundreds of transactions he barely has time to jot down, let alone analyze.

"Accurate records can more quickly reveal profitability in an operation. With these same computer records, farmers can plan more effectively and we can extend credit more effectively, thereby increasing the chances of success for more and more farmers."

A farmer writes in his monthly expenses on a prepared form. This information enters the system which produces a monthly or quarterly breakdown for the farmer telling him where his money has been spent, how much he received and what's available for future expenses.

An annual summary provides a business analysis, tax summary

report and depreciation schedule. Accurate depreciation records have produced extra tax deductions and investment credit in some cases.

## Bank Relocates DP Installation... And With No Service Interruption

HUNTINGTON, N.Y. — A plan that shaped up more like a plot for "Mission: Impossible" than a headquarters relocation program recently was developed by Security National Bank's data processing department's chief.

The plan, carried out over a three-day period, resulted in the relocation of the Long Island FIDP facilities, including a library of 2,000 computer tapes, without the loss of an hour's service.

Masterminding the move of Security's data processing center from its present location on Route 110 in Melville to its new site a half-mile away on Pineview Road was Bernard O. Knoess, vice-president of the bank's Automated Services Division.

Knoess, whose bank ranks 64th in the nation, gave this schedule for the weekend move: On Friday evening, all computer sys-

tems were moved to the one-story, 33,000 square-foot building which formerly housed a defense firm. The move was handled by computer specialists and technicians who worked through the night to install completely the bank's three computer systems, including two IBM 360/40s and a 360/30.

#### Tests Begun

By Saturday evening, the computers and all ancillary apparatus and furnishings were in place, and a series of tests were begun to ensure that all systems were functioning properly. On Sunday, Security programmers and operators began running their programs, ironing out EDP bugs as they appeared.

Set on a 10-acre landscaped site, Security's Data Processing Center is fully air-conditioned and has a 300 kilowatt stand-by generator for emergency use.

## Not Quite

A computer system is quietly changing tradition at the Columbus public library in Ohio. The system speeds tracks the 70,000 volumes borrowed each week from the library, Ohio's third largest, saving more than 1,500 man-hours weekly. When a book is returned, a sequentially numbered card is taken from the book. As soon as the card is pulled — on the same day — the book is returned to the shelf for further use. The data processing department sorts and redistributes the cards. Prior to installation of the system, it was common for books to be off the shelves two or three days after their return because of filing procedures. "Use of the computer also has centralized all book record-keeping in the main building, freeing personnel all over the system to provide better, more individual service to patrons," librarian Edward Daniels added. The library also uses its computer for ordering books from publishers, preparing overdue notices and registering patrons.

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Shhhh...

## Editorials

### Only the First Brick

Critics of a national data bank of personal information won the first round several years ago. But the sponsors of the data bank are back again, using a new rationale.

This time they argue that such a data bank is necessary to store the large amount of personal data necessary to determine the effect of federal programs.

The first step in this direction is Mr. Nixon's guaranteed annual income plan. Under the plan, all 24 million people receiving aid would have dossiers set up in a central computer file. As now written, the bill contains no restrictions or safeguards.

This bill would set an important precedent: that the government has the right to any data necessary to assess the impact of its programs, and the individual has no right to question the collection, use, and dissemination of this data. The bill will probably pass unquestioned, because many people feel that those receiving public assistance have no right to privacy.

But once established for welfare recipients, the data bank could easily be extended to include recipients of FHA loans, farm subsidies, college loans, and social security, as well as people getting aid from the Veteran's Administration and various state agencies. The national data bank could be built piecemeal, one segment at a time, until all are included.

The guaranteed income plan would be only the beginning.

## Letters to the Editor

### Punch Cards Baffle Noise

In regard to McBlain's letter [CW, July 15] concerning the use of telephones in a noisy data processing center, I simply hold a punch card like the mouthpiece of the telephone. This almost eliminates room noise and also allows the individual to speak clearly through the mouthpiece with little noticeable loss in volume.

Frederick P. Bradford  
Programmer Analyst  
Control Data Corp.  
Ardens Hills, Minn.

### System Can't Prevent 'Unethical' Data Use

In view of your recent interest in the security of personal information in computer files, you may be interested in the following.

In a recent case (*U.S. vs. Devay*, C.A.2, 5-14-70), an appeals court ruled that "the government has the right to require the production of, relevant information wherever it may be lodged and regardless of the form in which it is kept and the manner in which it may be retrieved, so long as it pays its reasonable share of the costs of retrieval."

Details of the case reveal that the court compelled Credit Data Corp. (a firm which maintains financial data on 20 million people) to produce records of one individual, for purposes of verifying his net worth, as reported on his tax return.

My observation is that there is one area of the personal privacy problem which cannot be addressed by system design. Specifically, the system cannot prevent the "unethical" use of the

data it contains if "the boss" orders such use. Previously it did not matter what "the boss" said, since the technical capability was not there.

A.J. Bowen  
Kingston, N.Y.  
See CW, Aug. 5.

### Military Contracts

Since you recently saw fit to give a headline to the publicity hunting statement of Cambridge Computer Associates regarding their refusal to do work on "certain military contracts"... although they admit that they have not bid on any questionable jobs and therefore have never had to turn any down, I would also like to publish a similar statement.

I am no longer doing brain surgery or space exploration. Like CCA, I will somehow exist with this loss of income.

Herbert Friedman  
Bellmore, N.Y.

### Infact on ITS System

In your July 22 edition you described a program series offered by Applied Decision Systems. The article states that "The programs are available on a time-sharing basis on a Com-Share network" and then goes on to describe various packages. The Infact program is owned by General Mills and is on the ITS time-share system.

Roy Mennell  
Manager of Systems  
Applied Decision Systems, Inc.  
Boston, Mass.

The Infact program, which runs on a CDC 3300 is available on the ITS network. The other programs which run on an XDS 940 are available on the Com-Share network.

## Still Afloat



### D.C. Data-Line

## Firm Locates Available Federal Grants

By Alan Drattell  
CW Washington Bureau  
WASHINGTON, D.C. — A farmer in the Midwest wanted to get a federal grant to construct a lake on his property so that he could stock it with fish. He contacted Applied Urbanetics Inc., a Washington-based corporation that applies advanced computer science to the problems of urban America.

Using its AID system, a data base of more than 1,300 federal assistance programs, Applied Urbanetics found a grant available. Similarly, a small city in the Southwest needed a sewer grant but could not get the needed funds through the Department of Housing and Urban Development. [CW, March 11, April 11]. Querying Applied Urbanetics' data base, the city found four other federal agencies offering sewer construction grants.

### 'Using Computers for People'

According to Alan T. Paller, 24-year-old vice-president of the year-old company, Applied Urbanetics is essentially "people using computers for people, rather than business using computers for business. Its focus is environment, rather than products."

"We deal with people who have never used computers before and they're afraid of them. But they need a fast response time," he said, "and we are able to give it to them by using the Honeywell time-sharing system."

"The information needed is indicated on special request forms mailed to us by our clients. We use a Teletype or CRT link from our offices in Washington, Philadelphia, and New York to a Honeywell 1648 computer in Boston."

Computerworld welcomes comments from its readers. Preference will be given to letters of 250 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington Street, Newton, Mass. 02160

"When the client receives the data from us he feels a lot more secure because the information has been filtered through human hands." Applied Urbanetics also uses service bureaus for batch operations.

Turn-around time from inquiry to answer is about two days.

In the AID system, the client is given the name of the appropriate funding agency, a description of the programs where possible, their funding levels, the use of the grants, and the name and telephone number of a particular contact.

### 'Underused'

"Until now," Paller said, "computers have been underused in areas of social need. For example, the bill from the water company each month results from computerized accounting, while at the same time the water in many streams is poisoned."

Applied Urbanetics is also working in several other areas, including urban renewal and urban construction management. And a fairly new element in its bag of services involves analysis of where federal money is being spent in relation to public need.

"We have collected a data base," Paller said, "on all federal assistance to all counties in the nation. We also have a second data base of social indicators such as the level of housing and poverty in a county — in all, 3,000 socio-economic variables stored on map tape."

"A third data base gives the center of population in every county. We have combined the three to find out how in a specific county U.S. Office of Economic Opportunity funds are being funneled into it."

(Putting the computerized findings, we learned that the Alphas, for example, little or no OEO funds are given to the black belt while Wallace County receives the most OEO funds in the state per capita."

The implications of this finding for the federal government can be far-reaching, however, Paller demurred in discussing what will

be done with the data.

Paller admitted what many Americans have suspected for a long time: there is a great deal of federal money available for nearly every conceivable project, and few states, cities and individuals are aware of most of them. With his aid, I put the Applied Urbanetics' system to the test and queried the computer if a grant would be available to finance the construction of a garage for my house.

The computer indicated eight funding programs available, and two of them seemed most likely to fit my needs.



Alan Drattell  
Upon further querying, the Honeywell system delivered the details on the two. One, from the Department of Defense, could be obtained if the proposed garage were to be used for some kind of public fallout shelter; the second, from Housing and Urban Development, required that the garage owner be a multi-unit small developer.

Paller was happy with the results. "Too often," he said, "there are federal funds available for questionable programs — such as for the farmer who got the government to pay for the construction of his lake and for stocking it with fish."

"Sometimes the funding that's there may not fit what you want specifically, but often the individual or the city can alter its plans to fit the federal assistance offered."

"I'm glad," he added with a smile, "that the taxpayers won't be paying for the building of your garage."

## What Is Your Application Type?

# Major, Minor or Make-Work Computer Applications

In a recent column based on what type of action can be taken to minimize the financial impact of Cobol overhead, the importance of the accounting system was brought up. It was argued that most computer accounting systems being based on machine utilization hindered rather than helped an installation to be efficient. In the series of articles starting this week accounting approaches that allow efficiency to be helped are suggested and the different roles of the technician, the accountant, and management are described.

One of the first things that is done when a computer is installed is to start allocating the costs involved to various user departments for the work that is being done for them. These costs are based on the machine time and staff it takes to run their computer applications. In most installations, however, no differences in the costing technique is used for different types of applications.

And yet there are, in fact, at least three different types of computer applications which can be treated differently for costing (and which, if treated differently, allow distinct advantages to be gained by everyone concerned).

### 'Main' Applications

The first type of application is of course the main one, the one for which you bought the computer. Perhaps it is inventory control. Your firm may be one which has a \$10 million inventory and can cut this by 20% if it has inventory control. Clearly then it is justified in putting in a \$40,000 computer system to run an inventory control system program. From the firm's point of view, it is worth two million just sitting in the bank.

Now, while it is worth that, that does not mean to say that the computer installation can reasonably ask to be given that amount of money for the work it does. It has to be given fair value for its work, but this is the value of the work done, not the value of the application to the firm. Naturally there is a relationship between the two meanings of value but it is very easy to confuse, and here value means "value of work done."

The question in setting the value of the work done on Main program so that the user department can be charged for main applications simply involves identifying the cost of running the computer department. This is a figure which is known, or can be found, and for Main activities can be machine time, programming the application, and all the other items involved.

In most ways this can be done on a standard cost basis. The inventory control application will be running, say, once a week and each run can be given a particular dollar value.

Where there are more than one Main program, then the costs of the department can be allocated between them in any way that management happens to choose, but between them the entire,

### The Taylor Report

By Alan Taylor



costs that are involved should be charged over.

### 'Minor' Programs

But all installations have other programs outside the ones which justified the selection and installation of a computer. The first such programs are those that are run in spare time. If you happen to have a computer sitting around the place that is idle three hours a day, then someone is going to come up with a suggestion - "Why don't you use our departments' boom-doggie?" and with some nice ideas as to what would be nice to have.

These are not the 'programs' that the equipment was selected for but are ones which use the additional spare capacity that has been obtained. What then are the differences in accounting for these Minor programs, and in accounting for the Main ones?

The difference can be seen by

Cost Factor	Without Payroll	With Payroll
Hardware Cost	\$500	\$500
Operational Costs	\$200	\$500
Value of Payroll	\$ -	\$305
Cost to set against inventory system benefits	\$1,000	\$1,305 - \$305 = \$995
Additional Profit to Firm	\$ -	\$5

Table 1. Balance sheets with and without payroll being run.

considering what is the best for the firm. If a major program has costs of \$200 per operating run, and \$800 for having the computer available to run it, then it is not worth running unless the value of the work done to the firm is \$1,000. But in the case of the Minor program it is worth running, using the spare capacity, whenever it can be shown that the additional cost involved in running the program (without any cost being attributed to the hardware which is already standing there) is less than the value of the work done!

To illustrate the point let us take a specific case. Considering the firm where inventory control is a Major application and where payroll is the Minor one.

If the computer hardware costs \$800, the operational additional cost for the inventory control cost \$200 and the operating cost of the payroll cost \$305, what is the minimum point at which it is worth running the payroll assuming that the inventory con-

trol application justified the installation of the computer?

Clearly, the minimum point is certainly not going to be less than the additional operational costs, in this case, \$300. The real question then is, is it any more than this? Let us assume that the value is slightly more than \$300, say \$305. And then let us draw up the balance sheets of the firm computer installation with and without the payroll being run. (See Table 1.)

### Minimum Value . . .

Clearly it has profited the firm to run the payroll in this case, and has profited it by \$5. Any profit is worthwhile and helps both the firm and the installation that it is allocated to, and so we can see that - from an accounting point of view - Minor jobs can be properly justified by charging them at a rate involved based with a minimum as being the amount of operating costs involved in running them.

A minimum value is all very well, but is only a minimum. How about a maximum? Theoretically there is no particular maximum, but practically there is a very real one. The payroll department will not appreciate being charged more for your running the payroll on the computer than it gets charged by going outside to a service bureau, or by running it itself. As far as the department is concerned it is a job that has to be done and it knows or can find out what the cost of it would be if it were run outside. This then gives a maximum value beyond which it is not reasonable or realistic that it should be asked to pay.

job for application in most installations.

This is one that will probably get many programs backed up. Merely talking of it will smack to them of being insulting, degrading, and all sorts of other things. But in fact, it is merely bringing into the computer room a recognition of the real facts, the same type of recognition as with having to bring into noncomputer departments when he is looking at how to computerize other departments activities. And what is sauce for

Alan Taylor, consultant, writer, and former editor of Computerworld, is president of Computer Management Aide Corp. of Framingham, Mass.

the goose is sauce for the gander!

These are those applications which are not Major ones - or Minor ones, but are simply Make-Work ones.

### Make-Work Applications

You cannot simply leave programmers, or operators, sitting there twiddling their thumbs. And yet you have got to keep those programmers around after they have apparently completed their programming assignment because their programs need maintaining. Also you have got to keep the programmers trained up to date.

The only way we know how to do this is to keep the programmers busy. Now for any Make-Work application, that is one that is not a specific major requirement for which the computer was installed, or one which is not an acknowledged minor requirement, the accounting rules change. The fact is that a program can be validly justified simply in order to keep the programmers skills up, and keeping the operator in a careful frame of mind.

The fact that the program does absolutely nothing for the firm, does not mean to say that it is therefore unjustified. Indeed the fact that it costs some money to run it - supplies, etc. - can be offset against the fact that it costs quite a lot of money to bring a new programmer into the

installation if the present one left.

### No Minimum

Looked at this way the question arises as to what is the minimum cost that can be charged to the user of the program without breaking our accounting rules in the case of the Minor programs we had a first possible approximation - the additional costs of running the program. But here that does not appear to be a usable figure.

The question is, is there a minimum cost for a Make-Work Program? The answer equally, clearly is "no". Even if the job is valueless it can still be justified - yet such a job can be charged at no more than its value, which is not zero. So there can be no minimum!

Now having dealt with minimum - what is the situation of the maximum? The maximum will again be the same maximum as we used in the case of the Minor programs, that is the cost involved to the user department in obtaining the word from internal or external sources. The allowable range therefore for Make-Work applications is from zero up to the outside cost of the work.

### Summary

These then are the major three types of applications and the set of different but equally valid ways of treating them from an accounting point of view. It is noted that some of these ways require the time costs of the computer as the basis for selecting either the maximum or minimum charge.

However, this is not to say that time charges should be ignored. In our next article we will be discussing where the time basis fits into this picture, and why this approach to accounting for computer costing has some very unusual and different characteristics from a management point of view, than the ones associated with time-based costing and charging methods.

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DU Data Usage

# Computer Helps Tampa Decrease Crime Rate by 6.9%

By a CW Staff Writer

**TAMPA, Fla.**—The computer has helped this city of 318,000 achieve the greatest decrease in crime of any city of its size in the nation—6.9%.

Exception reports prepared by the city's RCA Spectra 70/45 are used by the police department to deploy selectively its 565-man force to high-incidence crime locations.

Police Chief J.G. Littleton noted that the same technique is being used "in today's modern business world to assist management in uncovering problem areas that need immediate attention."

Natural boundaries, crime frequency, and population density are factors in a formula to divide the city into a network of 200 grids.

After analyzing various statistical inputs for robbery, burglary, and other crimes, the Spectra 70 prints out a map of the city, signaling those sections where criminal activity is on the upswing.

## Same Techniques

Littleton noted that the same techniques are being applied to traffic safety. The system also handles various other law enforcement and financial and ad-

ministrative tasks.

For example, detailed information on any registered motor vehicle in Hillsborough County can be retrieved through the three RCA video data terminals at police headquarters.

There are more than 300,000 registered vehicles on file, and plans call for expansion to include stolen vehicles, as well as those sought in connection with crimes.

Also scheduled is link-up with the FBI's famous National Crime Information Center in Washington, D.C., and the statewide police communications network.

As part of a five-year program, the police department will enlarge its own data base to cover information on stolen property, pawnshop turn-ins, wanted persons, criminal histories and traffic accidents and fatalities.

## Other Municipal Uses

In addition to its use in law enforcement, the RCA computer also assists city officials in administering an annual budget of \$60 million. It compares various budget items, both the past and present, makes projections and prints out its calculations.

The computer bills approximately 100,000 water, sewerage

and garbage accounts, and generates salary data for the city's 3,800-man municipal payroll.

## HUD

A participant in the Housing and Urban Development (HUD) Model Cities Program, Tampa is

also developing programs to use the computer for retrieving information required by the Federal Government on 35,000 residents living in depressed areas of the city and receiving various benefits from HUD. The city utilizes the computer

for monitoring the maintenance and operational status of its fleet of 1,200 service vehicles, as well as the fleet's depreciation costs. Growing at the annual rate of 15%, Tampa's current population is expected to increase threefold by 1980.

## NBS Researcher Outlines Essential Steps Involved in the Standardization Process

By Edward J. Bride  
CW Staff Writer

**GAITHERSBURG, Md.**—

Next time you're thinking poorly about standards, think twice.

It may be a lot of trouble to check all the publications, making sure your hardware, or your software, measures up to those voluntary standards you agreed to follow. But just think of all the work involved if you were writing those standards.

Harry S. White Jr. thinks about that work.

White is a researcher for the National Bureau of Standards here, and he has outlined the steps involved in establishing, implementing, and enforcing federal data processing standards.

He has generalized the standards-writing procedure for the benefit of anyone participating in the standardization effort, whether nationally or internationally.

Furthermore, Federal Information Processing Standards Publications (FIPS Pub) will soon be available through the NBS Clearinghouse for Federal Scientific and Technical Information.

This will promote wider and more effective use of these standards, NBS says, by the scientific community, industry, and commerce.

## Start From the Beginning

The procedure recommended by White logically starts with identifying the requirements and the benefits of the contemplated standards effort. This could involve consumer protection, public safety, or public economy.

Before initiating the writing of the standard, there should be a feasibility study to determine the financial and technical possibilities of completing the project successfully.

Then, according to White, priorities and scope need to be defined, so that resources and any necessary coordination can be planned in advance of the effort.

At this stage, the project can be reviewed, and a "project leader" selected to schedule meetings and establish administrative support from any necessary sources.

When the group is set up to take on this massive project, an early step is the identification and evaluation of alternatives. There are always several solutions to technical problems, and the alternatives must be established and documented.

Then, and only then, should the suggested standard be written.

## Only Halfway There

Writing the "first draft" of a standard is a milestone, which finds your "total standards effort" about halfway behind you. One of the difficult areas is implementation, and a schedule with exception procedures should be prepared. White notes that techniques facilitating the

effective and timely implementation of the standard should be prepared, with exception procedures considered, and defined.

All parties and organizations involved in the effort must now be brought into the project, via requests for review and comment.

All negative responses should be addressed and answered, with action made to resolve differences. Significant changes will probably necessitate a recoordination or resubmission of the proposed standard.

Then, a consensus of affected parties, preferably two-thirds according to White, must be determined. At this stage, the standard usually is different from the original proposal, White said.

Besides the standard itself, applicability and implementation may have to be coordinated, and therefore modified. White noted that exceptions to use of the standard should be "reviewed and clearly explained."

## Compare Cost Benefits

White declared that the cost benefits of implementation should be reexamined, including a comparison of conversion costs to expected benefits—both near and long term.

The approving authority may now be ready to receive the proposal, with all supporting documentation.

The approving authority may approve, modify, or reject the proposal. If accepted, the standard should be published and made available to all concerned.

Implementation is normally the responsibility of an organization, like the American National Standards Institute (Ansi), or an industry or government group.

White noted that each standard should have a "sponsor" or "agent" to be held responsible for standards maintenance.

And that's all there is to it. White noted that the order of submitting and achieving the standard may vary, according to a group or standard involved.

Maintenance will also vary, depending on the nature of the standard. In some cases, "detailed maintenance procedures" need to be determined in the early phases of development, reported White.

## "Broaden warnings spell glow for DP installations"

Consider this. Typical computer specifications require a power input range of - 8% to - 10% of voltage and a frequency stability of  $\pm 1/2$  Hz. Typical fluctuations greater than 10% for as much as  $1/2$  Hz are regularly experienced by leading utilities. If undetected, these fluctuations can cause computer errors resulting in costly down time and program reruns.

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- ```

LEVEL703
DATA NAME/ROST
TYPE7N
FIELD SIZE75
PICTURE X, 9, OR EDIT7X
VALUE7N
COMMAND7M
D OR L7D
DATANAME INDEX71
TO INDEX73
COMMAND7IF
INDEX75
OPTION NOT7NO
ENTER: >, <, OR <-K
0670 MOVE ST7 TO WD-TL.
0680 IF COST LESS ZROWS GO TO WRT-ERR.

```

The Cost data field was defined under working-storage (1), then referenced by its "index number" during procedure coding (2), to produce the desired Cobol source statement (3).

## Interactive 'Cobolx' Traches User in Source Program Coding

BETHESDA, Md. — Cobol programmers can concentrate on problem logic and let the computer develop the proper spacing, formatting and spelling with Cobolx, an interactive service for the creation of Cobol source programs available from International Telecomputer Network (ITN).

### Eliminate Typing Errors

In effect, Cobolx teaches the programmer in order to eliminate mechanical errors before the

program is generated.

In this way debugging can be devoted to logical problems, rather than "typical and arithmetic errors," according to the firm.

Cobolx output is a source program, stored on an ITN file. This can be compiled and tested under ITN's symbolic debugging system, Terminal Access to Batch Service (Tab), and later punched out on cards for compilation and utilization on the user's in-house system, if desired.

During the identification series, the user supplies the record data on object computer, program ID, and programmer name. In addition he names and identifies the uses of all files, and provides the record names for the files, and the length of the records.

The system then moves to the working-storage section, in which all records are considered.

Once the data names are defined, and before the beginning of the procedure division coding, the names—file, record and data—are listed by the system with individual code numbers (for each name).

### Shorthand Notation

The code numbers for the data fields are used with special assembler-like mnemonics for Cobol commands, to allow a shorthand notation for procedure coding.

During coding, the programmer can set up literals, as well as paragraph names, as needed, ITN said.

The commands available under Cobolx are said to include PERFORM, COMPUTE, ALPHABETIC, and IF, in addition to the more mundane arithmetic, data manipulation and I/O instructions.

The system uses concepts from Basic language time-sharing. Cobolx users can, for example, express conditional relationships with mathematical symbols, rather than with words.

Also from Basic, the system allows the user to abort an erroneous entry before completion, or to edit it after the line has been entered but before it becomes a fixed part of the source program being developed. In the data division, Cobolx allows only four level numbers but it does allow Level 77 and 88 items as well. Occurs and Redefine clauses, and hex, numeric, and Edit Pictures can be used.

The source programs produced by Cobolx can be compiled and then run directly on the 360 (under OS), CDC 3000 or GE 600 series, at the programmer's option.

ITN's own GE computers support teletypewriters, IBM 2741 and Data Products PortaCom.

The Cobolx system is available to ITN customers in the Middle Atlantic States, New England and the Midwest.

ITN has no initiation fee or monthly minimum billing. Connect-time costs \$10/hr, and CPU time 8 cent/sec. Mass storage costs \$11/K characters each month, the firm said.

International Telecomputer Network's main office is at 7315 Wisconsin Ave.

## 360 Installations Can Use Front-End Hardware, Software in 'TOL-360'

NEW YORK — Installations working with a 360 in a transaction-oriented time-sharing environment can use the Transac-tions On-Line (TOL-360) combined hardware/software system from Software Methods Inc. (SMI).

According to SMI, TOL-360 consists of:

- A software package to provide interactive formatting, file manipulation and record keeping.
- A front-end computer to eliminate the activities normally performed by IBM's software and communications control adapters.

### Time-Sliced Mode

The company explained that TOL-360 operates under DOS/360 and can support a "relatively large" number of terminals in a time-sliced, multitasked mode. The system is also said to allow flexibility in communications network design and support.

According to SMI, TOL-360 does not require reprogramming of existing batch programs. SMI stressed that TOL-360 is

not designed for on-line programming, although this could be achieved through batch processing capabilities. Instead, TOL-360 is designed to process transactions, the company said. These can be entered or retrieved from the system using TOL-360 Terminal Control Commands, or processed via a user-supplied program.

### Integrity Insured

Regardless of how transactions are processed, SMI added, the security and integrity of the user's files are insured by the use of passwords.

TOL-360 is available in either a fully dedicated or a multiprogrammed version. The dedicated version requires a minimum of 65K storage on a 360/30.

The multiprogrammed version of the system is said to allow normal background processing

simultaneously with TOL-360. However, it would require at least 128K and a 360/40, a spokesman added.

### Buffer

In addition to the 360, a line-control computer is used as a buffer between the remote terminals and the central processor. The control computer is treated as an ordinary device on a multiplexed channel, according to SMI.

Although SMI has a 'specific front-end controller that it recommends, a spokesman noted that almost any machine that is compatible could be used.

For that reason, the software is priced separately, at a \$50,000 'purchase' price. Otherwise, it is available under a 48-month lease for \$1,350/month.

Software Methods Inc. is at 150 East 40th St.

## 'Cosmos' Can Process Multiple Applications or Users

ARLINGTON, Mass. — Banks, service bureaus and other firms operating 360s in production

environment can use Cosmos, an "application management system" available from PHI Com-

puter Services to reduce design, implementation and production costs.

A joint development of PHI and Marine Midland Banks Inc., Cosmos is described as an integrated package of programs that supplies all the functions common to all serial file management applications.

The system is designed to accommodate multiple applications in one pass of a master file, or to handle a series of separate users for a single application.

Cosmos is made up of a specification translator and a production package. The latter consists of three subsystems, Input, Update and Report.

PHI said that the translator converts the user-supplied specifications into Cobol source statements. These are fitted into the subsystem source decks and compiled into customized individual programs.

The translator checks specifications, and aborts the compilation process if critical errors are detected.

The input subsystem accepts input transactions that conform to criteria established by the user, and rejects those that do

not conform.

It is also able to "explode" one source transaction into many, for use with different applications.

Beyond its obvious function of file maintenance and report preparation, the Update subsystem is able to generate inter-application transactions automatically.

The Report subsystem output may be in printed form, on cards or magnetic tape or disk, or on specially conditioned magnetic tape for microfilm.

The Report System Accounting Report can be used to prepare billings for service organizations.

The system functions in either MFT or MVT under OS/360 and requires at least 128K storage.

PHI recommends the use of six disk and six tape units, although a somewhat smaller configuration could be used.

The package is available for a one-time price of \$75,000, or for a monthly lease price of \$3,000, for a minimum of 24 months.

PHI Computer Services Inc. is at 800 Massachusetts Ave.

## Service Quotes Stocks

## Users Go On-Line to Financial Data

NEW YORK — Financial institutions can have on-line conversational access to a wide range of securities information from three different data bases, with Telsat70 service from Telsat Systems Inc.

Subscribers who do not require time-sharing service can have off-line access to the same information, a Telsat spokesman said.

On-line access to the data bases is provided through full Fortran IV-H and Extended Basic capabilities and through a Telsat-developed financial language called Assist.

The developers said that Assist can be used by an analyst or portfolio manager, unfamiliar with computer technology, to access or manipulate the information in terms with which he is familiar.

Information available through Telsat70, and the off-line Analyst's Information Device (AID) service, is said to include daily price-volume trading tabulations on nearly 12,000 listed and over-the-counter stocks and bonds. Also available on a same-day basis are six daily stock market averages and indices.

In addition, Telsat said that 60 balance sheet and income statement items, plus significant ratios, are available for 1,800 industrial companies and 100 utilities over a 20-year span.

Sixteen quarterly items and monthly price information for the same range of companies over a five-year period can also be accessed, the company said.

A spokesman explained that Telsat is able to provide the daily trading information on a same-day basis because the com-

pany produces and controls its own price/volume data base, Telsat70 (CW, June 10).

Without initiation fee or monthly minimum billing, Telsat70 costs \$9/hr for connect-time, 12 cent/sec for CPU time and 1 cent/K characters per day for storage of the user's own files.

Users of the off-line AID service are charged CPU time only, Telsat said.

Telsat Systems Inc. is at 150 East 58th St.

### Delta Data Services Expanded

WASHINGTON, D.C. — Delta Data Systems has expanded its training and installation service to service bureaus that purchase its proprietary accounting systems. The service is available at no additional cost.

## Instructors Can Teach Any Subject With Package for PDP-10 From DEC

MAYNARD, Mass. — Working with a DEC PDP-10 teacher can prepare lessons with a "computer-assisted instruction" package available from DEC's users group.

As with most CAI routines, this package allows the teacher to set up the course and organize the lessons as he desires. Interacting with the instructor, the computer "asks questions" as the lesson is being developed.

Text is accepted from the instructor and put in proper form automatically. Examinations with multiple choice answers can be inserted wherever desired.

From the student's standpoint, the instruction is individualized and moves at his own pace. DEC pointed out, however, that extreme slowness or failure to respond will cause the routines to branch to remedial portions of the lesson plan.

The package can be run on any PDP-10 having at least 32K words of memory. DEC tape versions of the routines are available to user group (Decus) members for \$15, and to non-Decus members for \$20.

The Digital Equipment Computer Users Society is at 146 Main St.

## Packages Geared to City Needs

NEW YORK — City governments can get problem-solving help in two critical areas by using packages from Systems RDI Corp.

The Public Assistance Processing System (Paps) is aimed at Medicaid and welfare problems, while the Automated System for Cost Distribution (Ascod) provides support in meeting federal and state requirements in reimbursable programs.

Systems RDI said that Paps is based on the use of terminal and imprinter intelligent identification cards. The system is modular in design to meet varying operational requirements.

Paps is intended to certify the acceptability of welfare checks, to enable Medicaid vendors to be paid within 24 hours, and to provide public assistance agen-

cies with an updated information base for planning and audit purposes.

Ascod applied accepted cost distribution algorithms to standard cost and time data. Also modular in design, it allocates personnel costs as a function of dollars or hours worked.

Systems RDI said that source documents can be keypunched or optically scanned. The system can handle all personnel, or operate on an exception principle, the company said. The basic Ascod calculates and allocates all costs of both worked and unworked hours, and provides summary and detail reports on both program/project and department/division bases.

### ID Cards

The identification cards with

Paps are used in the same way as embossed gasoline credit cards.

Welfare recipients receive an identification card to be presented whenever they cash a welfare check. The cashier telephones directly into the computer, gives the recipient's identification and check number, and gets a computer-generated voice-answer-back either approving or disapproving the cashing of the check.

Systems RDI said that hardware requirements for both systems are "minimal" and in most cases the systems can be tailored to fit existing configurations. Ascod has been implemented on a 360/20, the company said, and Paps can operate on a 360/40 with 8K, a disk or drum, and teleprocessing capabilities.

Cost of Paps ranges from \$25,000 to \$100,000, depending upon modules, configuration and population.

Cost of Ascod may vary from \$10,000 to \$25,000, the company added.

Systems RDI Corporation is at 1501 Broadway.

## Package Formats Text Headings, Artwork, Notes

NEW YORK — CompuComp Corp. has designed a service that automates typographic textbook composition consistent with industry-acknowledged criteria for high quality publication.

Called CompuText, the service features automatic elimination of widows; provision for a minimum of two lines of text below all subheads; automatic positioning of illustration space; and automatic positioning of footnotes.

According to a company spokesman, the CompuText user has great freedom in choosing type faces and sizes. The book designer is provided with a computer-controlled form by which he "write" commands to the computer. This method is said to eliminate much of the programming time previously required with typographic systems.

These decisions include adjustment to space around illustrations, footnotes, and extract; adjustment of space above and below subheads on a prorated basis; and running facing pages one or two lines long or short to eliminate widows, or to prevent a subhead from appearing at the bottom of a page.

The charge for this service is on a page-rate basis depending upon size of the page.

CompuComp Corp. is at 25 West 26th St.

## 360 INTERFACE PROBLEMS?

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Sigma 6 is our business computer. Designed for high-throughput commercial batch work, together with remote job entry, and interactive time sharing.

Sigma 6 uses all the software developed for Sigma 5 and 7, including operating systems for batch only or concurrent batch and time sharing;

powerful Cobol and Fortran compilers; several systems for structuring and manipulating files and large data bases. Plus mathematical and simulation packages.

To run these systems efficiently we gave Sigma 6 byte-string decimal arithmetic (as well as floating point), memory mapping, dual-access memory, an independent input/output processor, and many other high-performance hardware features.

We also gave it an astonishingly low price.

We went into business backwards and came out ahead.

**XDS**  
Data Systems  
Division of Digital Equipment Corporation

August 12, 1970



The DGC-301 includes constant data and control switches, a plug-board (luminized, in the center of the picture) and teletype keyboard.

## \$35/month Hard-Copy Terminal Has Modem, Weighs 25 Pounds

BLOOMFIELD, Conn. — A 25-pound alphanumeric terminal with less price as low as \$35/month from TransCom provides a hard copy of all data transmitted and received.

The CT 264 incorporates a silent electrostatic strip printer that can print 64 ASCII characters on a half inch paper tape. Characters are formed in 1/4 in. high format using a 5 by 7 dot matrix.

The printing mechanism is equipped with a "nine-finger" head, which is said by TransCom to enable it to print special characters such as stock market symbols.

The portable terminal transmits and receives at 10 char/sec. with transmission characteristics identical to a Teletype 33. It contains a self-contained modem compatible with a Bell System 103A or 103E data set at the computer end.

Connection to a normal dialed telephone line is through a Bell System data coupler or a TransCom acoustic coupler.

Control characters such as carriage return and line feed are accepted by the CT 264. Though meaningless to a strip printer, they cause a unique character to be printed on the tape. This is said to be of help to the user in evaluating line conditions.

The CT 264 operates equally well, the company said, as an inquiry response or data input terminal, where alphanumeric data is required.

When equipped with a CPI-64 Card Punch Interface unit, the terminal can be used to punch an IBM 029 keypunch. The terminal can also be used to punch paper tape by connecting it to a PPI-64 Paper Tape Interface.

The terminal is equipped with

a manual alphanumeric keyboard, with a typewriter format as its input device. Transmission rate is 10 char/sec half-duplex, with odd or even parity.

The CT 264 is available on a five-year lease at about \$35/month and on a three-year lease at

about \$52/month. Quantity, price discounts are available. Purchase price of the terminal is \$1,595.

First customer deliveries are scheduled for September, 1970. TransCom, Inc., a division of Hi-G Corp., is at 12 Tobey Road.



TransCom Portable Terminal

## Israeli Minicomputer Features Interfaces, Software

WHEELING, Ill. — The Elbit-100 is manufactured by Elbit Computers, Ltd., of Haifa, Israel. It is a small, high-speed, general purpose minicomputer with low-cost mini peripherals and associated system software, according to Electronics Products International Corp. (Epic), the distributor.

The internal design of the Elbit-100 features monolithic integrated circuits. The 2.56K core memory is available in sizes from 1K to 12K 12-bit words. The processor has more than 100 instructions, including indirect addressing.

A 256-word ROM with a cycle time of 400 nsec is included. Among features offered at no

extra cost are a buffered Teletype interface, four priority interrupts, real-time clock, hard-wired bootstrap loader, automatic power-fail detection and restart, and power supplies.

The standard Elbit-100 I/O bus can accommodate up to 256 devices. Several functional I/O cards are available off-the-shelf, Epic said, to accommodate standard peripherals such as card readers, printers, paper tape readers, disk files, and key-board display units.

Functional I/O cards for real-time or special applications that require relay outputs, contact closure sensing, electronic pulse outputs, and analog inputs and outputs for reading voltages or driving transducers are also available.

These various devices, Epic said, are provided with I/O drivers and are easily connected to the Elbit-100 I/O bus due to the I/O system design.

According to Epic, the Elbit-100 has proven its reliability with hundreds of installations. This, the company said, is demonstrated by a one-year warranty offer, which is the result of thousands of hours of reliable operation.

A software library is available that includes FULL TRACE program, utility routines, a float-

ing-point math package, single and double precision fixed-point conversion routines and math package, and a two-pass assembler.

The assembler package is said to be unique in the minicomputer area, in that it allows the use of both hexadecimal and decimal notation. Symbolic instruction labels up to six characters long are also permissible, an Epic spokesman added.

In addition to the packages already available, a Fortran compiler is presently under develop-

ment, the distributor said.

The basic Elbit-100 is priced at \$4,650 FOB Wheeling, Illinois. It includes 1K of core memory, Teletype interface, real-time clock, four levels of priority interrupt, and 256 words of ROM. It is currently available 15-30 days after receipt of order.

Additional core can be installed on-site and is available on a 30-day delivery schedule.

Electronic Products International Corp. has its general offices at 649 N. Milwaukee Ave.,

Chicago, Ill. The company, data is generated by several measuring instruments. Before this data can be analyzed or reduced, it must be compiled into a form acceptable to the computer.

The operator can use the terminal's keyboard to enter program or file information, activate the DGC-301 recording cycle, and then have the computer read the results on the terminal.

According to the company, the DGC-301 makes it possible to have a data acquisition system tied to a large computer for less than the cost of a small computer.

The full programming system starts at \$2,400, including 20 bits of bipolar logic MSI memory. A hard-wired, dedicated system with only a fixed formatting capability and without memory starts at \$800.

The systems are currently in production, the company said, and being shipped in 30 to 60 days depending on the data terminal being used by the customer. Currently, systems are being built to accommodate Teletype Models 33 and 35.

Systems to be used with other terminals, such as the Datapoint 2400 are being developed, the firm said.

Data Graphics Corporation is at 8402 Speedway Drive.

## Price Cut on Supernova

SOUTHBOROUGH, Mass. — The prices of the Supernova series of minicomputers have been reduced about 18% by Data General Corp.

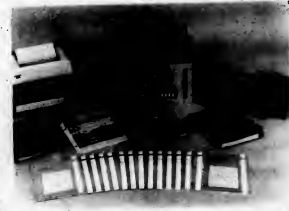
The Supernova, previously priced at \$11,700 for a configuration with 4K 16-bit words of core, data channels and Teletype interface, now sells for \$9,800.

The price of the Supernova central processor has been reduced from \$6,850 to \$5,600, and 4K memory word subsystems have been reduced from \$4,500 to \$3,850.

Data General said that the discount schedule previously applied to the Supernova will still be applied at the new prices.

Discounts range up to 40% and are calculated separately on each Data General computer subsystem.

The price changes become effective on Aug. 1, 1970.



Elbit-100

## Sycor Terminal Analysis-Part VI

# Users Pleased, Operating Problems Being Corrected

By Malcolm L. Stiefel

Special to Computerworld

Sycor users report general satisfaction with the terminal, dissatisfaction with maintenance and with the operator's manual. The manual is being rewritten, but the maintenance problem may not vanish so quickly.

Sycor has taken a major step toward proper maintenance support by signing an agreement with Honeywell in areas where Sycor isn't represented by its own personnel.

Until recently, maintenance has been provided in many areas by the manufacturer's representatives who work with Sycor around the country.

On the other hand, users have been generally happy with training supplied by these same representatives, and with their willingness to answer questions.

Users say that they were plagued by problems with the cassettes two or three months ago, but that these problems have been cleared up. Cassettes now being delivered are reported to be working without trouble.

Early difficulties were also noted with the data converter. In one case, Sycor had to replace the entire unit after a month; but the replacement worked properly.

### Quality Control

Sycor appears to be seriously trying to correct the early shortcomings by emphasizing quality control in the factory.

They have several computer-controlled test stations on the production floor, for subassembly and final assembly testing. Each unit is also subjected to a burn-in for several hours before it is shipped.

This effort, together with the Honey-

well pact, may ultimately clear the terminals of chronic problems.

Another early user problem occurred when an operator, in using the terminal's free-form mode (as opposed to the format-controlled mode) to correct an entry would write over the end of the original record and into the record gap.

Since this erased the end-of-record mark from the tape, the original record was lost in subsequent retrieval. This logical deficiency has been corrected in terminals now coming off the line, according to Sycor.

Sycor claims 60 to 90 day delivery on the terminals, but users report times varying from one week to one month!

One user, at the University of California at Santa Cruz, said, "I ordered the terminal on a Friday and received it the following Monday!"

Of course, Sycor hasn't delivered many terminals domestically yet, so it remains to be seen how quickly customer orders can be filled as their volume grows. Nevertheless, the figures reflect the existence of a viable, responsive production facility at current demand levels.

None of the users contacted actually made a point-to-point evaluation of Sycor with Visatron equipment, but Sanders, Novak, De-Tel, and MAI equipment were used. Sycor, according to the users, did well in the evaluations.

In most instances, the application was a

Visatron's price increases and switch to a purchase-only policy has prompted a search for suitable alternative leased equipment. In this series, CW examines the Sycor terminal, which comes closest to Visatron's System 21 in features and cost while offering users the added capability of interfacing with major manufacturer's computers.

remote batch operation, where Sycor is well suited and some of the others are not.

At the University of California, the basic terminal was being used with a data converter to put student financial aid data on their IBM 360. They also intended to use the same configuration to computerize their academic personnel records.

The school had a 1,200 baud Ascii communications option on order along with a Sycor printer. They expect to use terminals for administrative purposes at several locations on the campus.

The printer, which would be co-located with the data converter, would be used to capture "essential documentation," while all other data would wind up on 9-track magnetic tape.

Eventually, they want to use the Sycor terminal as an element in the multiprocessing system, with the terminal hardwired to their IBM 1130 computer. The cassettes will store X, Y coordinates of various kinds of graphs, and the 1130 will be used to predict trends from the stored information.

They plan to have the 1130 dedicated to administrative use for part of the day, to instructional and academic use the rest of the time.

### Difficult to Learn?

Another user, who complained that the terminal operation was difficult to learn, was using a terminal and data converter to store engineering change proposal information, and to convert the data for batch processing on his RCA Spectra 70 computer.

At the time of the interview, this user was conducting a controlled experiment to evaluate the throughput of Sycor's gear with respect to the keypunch operation.

Results indicated that Sycor's system was much faster, at the source location, than the centralized keypunch operation; the user also found a lower overall incidence of errors with the Sycor terminal than with the keypunch.

This user cited the difficulty of entering multiple format records, where a very long message, exceeding 200 characters, is to be entered. In this case, the message must be entered in chunks, each with its own formatting program.

Each time a new chunk is to be entered, the operator must first summon the corresponding format from the second cassette. The user found that this process was slow and that it led to operator errors.

Malcolm L. Stiefel is an independent consultant in the area of systems design. He has had extensive computer peripheral experience.

# Bound-up in EDP problems?

Successful EDP management depends upon getting the right computing power to the right place, at the right time, at the right price — in spite of problems!

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use. Operator program loading selects the program for the computer of your choice. You merely dial-up and get on-line. It's flexible, too. Change or add peripherals as your needs change.

The basic DTS-100 terminal includes its own mini-computer. To program communications formats and compress data. Its own I/O processor controls the peripherals and data set interface. And its peripherals offer the right functional combination for the speed ranges you need. Card readers read at 400 or 600 cpm. Line printers print at 300 or 1000 ipm. Card punches punch at 100 cpm. Magnetic tape units — 25 ips 7 or 9 track transports intermixed — are IBM compatible. CRT's, too.

One more thing before you go.

We'd like to tell you more about DTS-100. Write for our Bulletin 1035. Or call us. Remember you can use DTS-100 even if you don't have your own computer but need computing power. It talks to them all. Besides, it costs a lot less to use. You'll like that.

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manipulate a typewriter, she can enter data. And she can verify data on the DATA/SCOPE™. For her, it's about as difficult as watching TV. She can learn in two hours. And our system doesn't depend on her accuracy alone. The computer validates the input information, allows verification, searches for any record and displays 480 characters at a time. If she still gets

into a jam, our exclusive "Help!" button gets her out of it. We made it fast to save time. We made it operator-proof to save money. Of course, these are things you'll figure out when you see it yourself. So write or phone ENTREX, Inc., 1113 Hartwell Ave., Lexington, MA 02173. (617) 862-7230.

**ENTREX**

# IBM Training Network Teaches Employed 50 Subjects

POUGHKEEPSIE, N.Y. — More than 50 in-house training courses ranging from chemical safety to data processing principles are being studied at the same time in a single classroom via computer.

The classrooms are linked in a CAI network that encompasses

11 IBM manufacturing locations. At the center of the network is an IBM 360/50 located at IBM's Systems Manufacturing Division plant here. This computer channels the courses from files to over 90 typewriter-like terminals at the manufacturing sites.

The students are IBM em-

ployees enhancing present skills or learning new ones. All receive individualized instruction.

Moreover, each student can arrange his classwork to fit his schedule; each time he enters the classroom, he knows he will pick up where he left off.

Instructors, using IBM's Coursewriter language, prepare the course program in conversational fashion; after each brief to see how well he has grasped the material.

The course is paced to the student — the same course program presents its material in different ways depending on a student's progress.

A student may interrupt a course to insert his own comments about the material. By reviewing these comments later, together with students' test answers and grades, an instructor can monitor the progress each student is making in his course.

## System Benefits

Space can be used efficiently. An area that holds 15 student terminals, for example, can be running 15 different courses at the same time. On the other hand, one instructor, through the computer, can "teach" a course at different geographical locations simultaneously.

Other instructional media can supplement the computer-aided instruction. A small document file gives students "hands-on" experience in a filing course; for instance, an oscilloscope course refers the student to a facsimile of an oscilloscope screen pattern on a 35-millimeter slide. Other audio visual media such as films are used to

augment the computer.

When they need it, students can get personal help from a classroom supervisor who supports several student terminals. In addition to presenting course material, the computer performs administrative tasks, including the accumulation of student data and calculating and filing test marks and final grades.

## Principles, Procedures Text Is Updated by DPMA

PARK RIDGE, Ill. — A new edition of *Automatic Data Processing, Principles and Procedures*, authored by the Data Processing Management Association (DPMA) and Elias M. Awad, has been published by Prentice-Hall, Inc., Englewood Cliffs, N.J.

This second edition introduces the concepts and applications associated with third generation computers and focuses on business and industrial programming with Fortran IV, Cobol, and PL/I languages. The first edition was published in 1966.

DPMA is the largest professional organization serving the information processing and computer management community. Awad is on the faculty of the graduate school of business at DePaul

University, Chicago.

Five new chapters have been added and the text has been considerably rewritten to include the latest information on input-output media and devices employing third generation computer hardware.

Available with the book is a workbook which gives supportive treatment of the text through selected readings, and a teacher's manual, at extra cost.

The price of the book is \$9.95 to DPMA members and \$13.25 to non-members plus 50 cents for postage and handling, in U.S. funds or equivalent. It can be obtained either from the publisher or DPMA at 505 Bush Highway, Park Ridge, Ill. 60068.

## Facility Management Study Seeks to Define Standards

NEW YORK — Adaspo, in its continuing efforts to serve the "key elements comprising the computer services industry," has formed a Committee for Data Facility Management.

Spearheading the committee's efforts as its first chairman is John P. Mooney, president of International Computer Management Corp., New York.

Mooney indicated that the initial purpose of the committee will be to define, organize and

implement standards for an industry-wide program that will enhance the development of this new segment of data processing.

In addition to the Committee for Data Facility Management, Adaspo has within its organization the Software Section and the Computer Timesharing Service Section.

The association has nearly 250 member companies with 600 data centers in the U.S. and Canada.

## Voluntary Standards Seen Costing \$6 Million, Manufacturers Pay Half

WASHINGTON, D.C. — At the 51st annual meeting of the American National Standards Institute, C.W. Fritze, director of corporate planning, Control Data Corp., reported that the costs for developing U.S. computer industry voluntary standards are estimated in a study by the Business Equipment Manufacturers Association to be running at a rate of more than \$6 million a year.

Of this cost, more than half is contributed by manufacturers. The balance comes from government, and other users.

Most of the cost is attributable to providing representatives to attend standards meetings.

The \$6 million spent on standards represents about 0.1% of the value of computer equipment produced in the U.S. each

year. Fritze pointed out that his company alone spent on the order of \$200,000/yr on standards.

He also stated that the risk of nonconformity was high and the cost of product design or redesign to meet standards already established was very high.

He stressed that top management must recognize the costs and risks of standardization and attempt to minimize these by early participation and good standards planning.

NBS currently is attempting to identify all government participants who are contributing to the development of standards.

Early estimates place this figure at close to 250 individuals. NBS alone has 14 professional full-time standards experts.

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## FCC Approves Sale of TWX Network to Western Union

By Ronald A. Frank

Technical News Editor  
WASHINGTON, D.C. — The FCC has given final approval for the sale of AT&T's Teletypewriter Exchange Service (TWX) to Western Union Telegraph Corp. Under the terms of the \$85 million sale, Western Union would assume control over Bell's TWX network facilities and customers. Included would be the eventual interconnection of WU's Telex system with the TWX network.

In addition, WU will pay \$5 million to independent phone companies for non-Bell portions of the TWX network. An FCC spokesman said the commission's approval would finalize the sale unless any appeals were filed. He said that under the plans proposed before the commission, AT&T and WU would probably agree to set a closing date in about eight months to finalize the sale. [WU announced that the closing is scheduled for March 31, 1971].

Actual interconnection of TWX and Telex customers would probably be completed about 18 months after the closing date, the spokesman added.

The additional delay would be caused in part by the fact that TWX and Telex messages are transmitted at different data rates.

### Different Codes

Telex terminals generally use Baudot code and transmit at a rate of 66 word/min, while a Model 33 Teletype unit uses ASCII code and transmits at 100 word/min.

There are currently about 60,000 TWX sites and 33,000 Telex installations which will be affected.

In order for TWX and Telex traffic to be interchanged, WU has proposed a computer-controlled store and forward switching system that would compensate for differences in transmission rates.

The FCC, in a tentative ruling last April, said that common carriers should not be permitted to offer store and forward message switching when this type of service was designed primarily to provide data processing services.

However, a store and forward message switching capability provided by Western Union solely to interconnect TWX and Telex data users would probably not be challenged by the FCC or others.

A final decision regarding the role of common carriers in relation to providing DP services to users is still awaited from the FCC. The commission is currently considering comments submitted in response to its tentative ruling on this question.

### IBM Modems Operate Over Leased C-2 Lines

GAITHERSBURG, MD. — IBM has developed a Model 2 and Model 3 of the 4872 Modem which will permit communications over leased C-2 telephone lines at 4,800 bit/sec.

With these new units, a communications network can be designed to permit a central processor at a home office to communicate with other computers or terminals at many different locations using a common leased telephone line.

The IBM 4872 Modem, Model 2, is designed for operation with a master station. Model 3 operates with a slave or remote station.

Price for the purchase-only multipoint modem is \$4,850 for either model.

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## Touch-Tone Input, Voice Response System Proving Significant in Communications

By Leon Jackson  
and David Dobiec

**Special to Computerworld**  
The ability to use, as a computer terminal, any standard Touch-Tone telephone, or rotary dial telephone with a Touch-Tone pad, makes the Touch-Tone input and voice response system a very significant factor in the developing communications industry.

Requirements for data entry and retrieval, where the average call is of short duration, and where hard copy is not essential, are natural applications for a voice response system.

Entry to the system is in the form of Touch-Tone data using the keyboard of the telephone. The computer analyzes the data and responds to the user in the form of messages constructed from program selected pre-recorded words or phrases.

Voice response systems are not new to the computing industry. Of the applications presently being served, banking has proved to be the most successful with many systems installed and running. A major reason that the total number of installations is limited, however, has been the requirements for the computing center to use a medium- or large-scale data processing system.

While Touch-Tone service is by no means available on a national scale, it does exist in several major cities. Also, the availability of an inexpensive Touch-Tone pad from the telephone company allows any rotary dial telephone to become a computer input device.

### New Applications

The introduction of new voice response systems into the marketplace has broadened the range of applications which can be handled by this communications facility.

Small inexpensive systems based around minicomputers and having the capability of data-base storage, enable many data entry and retrieval applications.

## Hartford Denies Phone Company Error Accusation

**NEW YORK**—Multimillionaire Huntington Hartford has denied published reports that he accused the telephone company of blaming erroneous telephone directory listings on a computer error.

Hartford did file a suit, seeking \$2 million in damages for "lost revenue" from the Show Magazine. The suit charges New York Telephone with "gross negligence" or "willfully" misrepresenting two telephone listings for his magazine, which is headquartered here.

Hartford told CW that the telephone company did not say the errors were directly computer-related, although the suit does allege that company representatives stated "that since the pages of the directory had already been printed under a computer system, defendant could not make the correction."

tions to be handled independent of an EDP system. The data base can be updated by an offline means such as magnetic tape. Alternatively, such a system can operate as a voice response data concentrator for a large EDP system. Since it is a data concentrator, it may be located in the computing center, or it may be remoted in a geographical location which minimizes the long distance telephone cost.

For such applications as credit checking, inventory, plant data entry and balance inquiry, the average call is less than one minute. This means that the system with just a few simultaneous telephone lines can support a large throughput. Regarding the vocabularies used in such systems, there are techniques available which can provide practically unlimited vocabularies, but in practical applications it has been found that from 32 words to about 250 words adequately handle the requirements.

Touch-Tone input and voice response systems are now available which provide an inexpensive data entry and retrieval system and which use the communications device familiar to everyone—the telephone.

Entry is by a simple 12-button keyboard, and response is in the form of human speech. Eventually, the housewife will make use of the power of the computer by such a system, but in the meantime, there are many practical applications where the voice response system provides the only economic method of communication.

*Leon Jackson is the vice-president of marketing, and David Dobiec is the market support manager for Datatrol Inc.*

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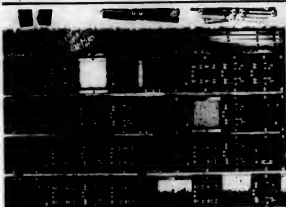
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Expanded version of Logic Lab I, computer "Tinkertoy."

## 'Comp-U-Kit' Is Aimed At Solving Logic Problems

SKOKIE, Ill. — The simplicity of Tinkertoy, Erector, and American Bricks is reflected in Comp-U-Kit, according to Systems Measurements Inc. (SMI), makers of the new hobby/training device.

A difference exists, however, in that engineers, hobbyists, and the curious now have a tool which can help them uncover logic problems and learn about the innards of computers.

The basic Comp-U-Kit unit is called Logic Lab I, and is primarily aimed at technicians upgrading professional knowledge, science teachers looking for new equipment, or students seeking to be a top-notch "Tinkertoy" for the DP professional.

Comp-U-Kit is reminiscent of the "10-in-1" electrical hobby kits, noted SMI President Richard A. Karlin.

Those kits were limited because of component layout or the inability to expand, he said. The computer kit is powered by a six-volt battery or optional power supply.

Logic Lab I is the 4-module version of the kit. Each module is an entity, said Karlin, with parts labeled, symbols clearly in

sight.

"Breadboarding" Circuits  
"Thus, modules can be used in 'breadboarding,' or actual testing of circuits in prototypes before assembly-line production of computers or their components."

Karlin said that, with 16 modules, Logic Lab can "carry out most anything a small computer can do, [including] logic operation, add, subtract, and divide."

He added that, within a square foot of space, a person could assemble modules in such a way as to demonstrate the basic flow between registers, and the basic arithmetic capability. This, too, would take about 16 modules, "about all a student really needs."

At a cost per module of about \$5 plus that of the integrated circuit and supporting hardware, Karlin claimed that an engineer could "breadboard" a minicomputer at a reasonable cost with 64 to 128 modules, "and that's still desktop size."

## Revenue Agents Employ Computer To Sniff Out Cigarette Bootleggers

ATLANTA — Georgia revenue agents are putting their computer to work to help track down cigarette bootleggers with a system that promises to save Georgia taxpayers hundreds of thousands of dollars in lost revenue.

The system will aid in the detection of cigarette bootlegging, the transportation of cigarettes without the proper state tax, by telling Georgia revenue agents how many cigarettes are coming into the state and where

they are going.

For example, if a city showed a sudden decrease in per capita tax paid cigarette sales, revenue agents would suspect it as a point of bootlegging activity and send investigators.

Cigarette manufacturers supply monthly computer tape records of cigarette shipments coming into Georgia. By feeding the tapes into an IBM 360/40 Georgia officials get a printout of this information by wholesaler or distributor.

## Pirates Scoreboard Has the Data

PITTSBURGH — The new home of the Pirates baseball team, Three Rivers Stadium, has installed in center field a huge million-dollar formation data play scoreboard, towering 30 feet high, and 274 feet long, to increase the baseball fans' enjoyment and understanding of the game.

The scoreboard, designed and developed by the Stewart-

Warner Corp., Chicago, Ill., is controlled by a Digital Equipment Corporation PDP-8 computer.

The computer, located in the press box area, allows a non-technically oriented operator to manipulate a series of push buttons on a keyboard console. These buttons cause words to move in and up, down, or lateral direction, to expand or contract.

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## Experiencing 'Substantial Losses'

# New Viatron Management Mulls Merger or Acquisition

By Michael Merritt  
CW Staff Writer

BEDFORD, Mass. — Is Viatron going bankrupt? Or will it be acquired? Or will it "make it"? The terminal-maker revealed that it is still experiencing "sub-

stantial losses" when it announced its most recent management shakeup, and the magnitude of these losses has been a subject of speculation throughout the industry, and worried speculation by Viatron dealers.

Viatron sources have confirmed that negotiations are going on with several companies involving acquisition or merger in one form or another.

A Viatron spokesman has said, though, that in the quarter ended July 31, 500 System 21 terminals were delivered, almost all sales rather than rentals. At an average cost of \$4,800 per terminal this means System 21 revenues of \$2.4 million.

Guessing at 10% of this figure for upgrades and add-on, and including \$225,000 from operations of subsidiaries — slightly less than the amount from the second quarter — one comes up with an estimate of total revenue for the third quarter of \$2,665,000.

### \$1.6 Million Loss

In the second quarter Viatron listed costs and expenses of \$4,462,000, including R&D. If this figure approximates that for the third quarter, then the loss comes out to \$1,577,000.

About that last assumption: the third quarter is the one in which the cost-cutting rampage started, as well as the one in which fairly high volume production began.

Viatron's former president, Edward M. Bennett, predicted that the cutbacks would save \$8 million a year — \$2 million a quarter. Balancing these savings — and Bennett's estimate seems high — are increased manufacturing and inventory costs.

A loss of \$1.6 million for the quarter would bring Viatron's total loss since its beginning to a shade less than \$20 million, while its total revenues from sale of stock and debentures are about \$36 million. So there should be enough money left for Viatron to go on making waves for a while.

But the figure of 500 terminals sold also reveals another interesting fact — the System 21 is not selling like hot cakes.

For the quarter Viatron should have been able to produce 1,500 to 1,800 units, and the lion's share should have been available to sell. That actual sales were only a third to a half of potential sales shows that the change to a sell-only policy in times of tight money has knocked Viatron's dream of becoming the "GM of electronics" into a cold hat.

Without a rental policy — which only a few individual dealers are providing — you can't have mass sales; without mass sales you can't have mass production; without mass production you can't have a cheap machine — or mass profits.

Which brings us to the remarks

(Continued on Page 30)

## Potter Printer Available To OEM User, T/S Firms

PLAINVIEW, N.Y. — A printer from Potter Instruments Co. is sold by Potter to fill the void between sequential and line printers. The printer, the LP

3000, operates on a new principle using a rotating scanner and 12 actuators.

The simplicity of the mechanism and the use of large-scale integrated circuits are said to make possible a price that is said to be only slightly above that of standard I/O typewriters.

The LP 3000 operates at 300 char/sec or 136 line/min using 64 characters and 132 columns. It is an impact printer using a 5 by 7 dot matrix and thus can produce multiple carbon copies. The speed of the printer is said to match it to standard voice-grade telephone lines.

### Applications

Applications for which it is suitable, according to Potter, include remote batch terminals, minicomputer output, message terminals, time-sharing terminals, and auxiliary printing on larger computers. Graphics as well as alphanumeric characters can be printed.

Used by Potter as a component of its data terminal, the LP 3000 is available for sale to OEM firms and time-sharing concerns. The price of the LP 3000, in 100 quantity, is \$3,385. Delivery is scheduled for the first quarter of 1971.

Potter Instrument Co. is at E. Bethpage Rd.

## Univac Grabs Huge Aircraft Computer Pact

ST. PAUL, Minn. — Univac has landed a contract in excess of \$40 million to design and develop computers for the Navy's new S-3A antisubmarine aircraft. The three-year contract with Lockheed-California Co. calls for Univac to design and manufacture nine 1832 multiprocessor computers and provide all of the systems software.

Under the project, Univac will establish a systems software facility at Valencia, Calif., that will be employed mainly to provide test and development services.

The computer systems under the pact have an I/O speed of 1.5 million word/sec. It has two central processors, two I/O controllers and a mated film memory. The unit will interface with other avionics subsystems, the firm said.

## Ampex Announces Entry Into Disk Drive Markets

CULVER CITY, Calif. — Ampex Corp., already a formidable competitor in the OEM tape drive and memory markets, has entered the battle for the fast-growing disk drive business.

The firm has purchased Clasco, Inc., Sunnyvale, Calif.-based subsidiary of Computer Learning and Systems Corp., Cheryl Chase, M.D., according to Eugene E. Prince, vice-president and general manager of the Ampex Computer Products Division.

The acquisition was for an undisclosed amount of stock and cash. Clasco, organized one year ago, has developed a computer disk drive system that is completely plug-to-plug compatible with the IBM 2314 disk systems used with the IBM 360 and 370 computers, Prince said.

The Clasco disk drive is not currently in production, Ampex said, but they predicted that it would be coming off production lines in the near future. The first units will be shown at the Fall Joint Computer Conference.

The price of the unit has not yet been established, Ampex added, but said it would beat the IBM disk drive price, by about 20%, making it a strong competitor in the present market.

"The addition of Clasco's disk drive capability is a part of a continuing program to broaden Ampex participation in the worldwide computer peripherals market," Prince said. "We now offer core, tape and disk memory equipment to both end-users and original equipment manufacturers."

Clasco became a part of the Computer Products Division, effective Aug. 1. Engineering and development facilities will remain in Sunnyvale for the foreseeable future, Prince said.

Approximately 14% of Ampex corporate sales for the fiscal year which ended May 2, 1970, were in the computer peripherals field, Prince said.

"We intend to raise our percentage of total Ampex sales during the current year and are certain the addition of this disk capability will play a large role in our continued growth," he concluded.



Key-to-Tape Units



CRT Entry Devices



The Ubiquitous Teletype



Optical Readers

Which one of these units is ahead in the growing data capture equipment market? The four units above are strong competitors, but it appears that the ancient, but honorable, keypunch will still be in use in 80% of the computer installations in the U.S. in the next five years.

## Competitors Vie for Data Capture Sales But 'King' Keypunch Still in the Lead

NEWTONVILLE, Mass. — If you think you can build a "better mousetrap" for the data capture market, users seem willing and ready to pay the freight.

In a recent CW survey of 1,647 computer installations, more than two-thirds considered input a greater problem than output, and 53% admitted that they expected to spend more on input operations in the next five years.

Out of the installations, only 17% expect their data capture costs to decrease and the remaining 30% expect the costs to remain about the same.

### Data Capture Budget

At present only 3% of the sites spend more than 50% of their DP budget for data capture.

Sixty percent spend between 1% and 10% of their budgets in this area and 23% spend between 11% and 20% of the total budget on data capture.

The only type of data capture equipment presently on the market that will be in use in less than 1% of the installations in five years is the present is the ancient keypunch.

Of the respondents, 95% now use keypunches, and 80% expect to be using them in five years. In the same period the percent of installations using key-to-tape devices will jump 9%, from 22% to 31%.

Data collection equipment will show an increase of 8% in terms of the total number of installations using it, from 11% to 19%. OCR equipment, now in use in

14% of the installations, will be used by 16% of the sites in three to five years.

Direct input equipment such as CRTs, Teletypes, typewriter units, 1050s, etc. is presently the second largest source of data capture behind the keypunch with 34% of the installations. However, this will only increase by 2% in the next few years.

### Human Error

Even though 82% of the installations consider human error a very serious problem, it would not be a major factor in their equipment purchase decisions.

The main criteria they would consider in equipment purchases is still cost, the survey revealed. The cost factor is giving a select-

(Continued on Page 30)

# Supplier to Enter Replacement Race With IBM

DANBURY, Conn.—Bard-Parker, which has supplied IBM with subassemblies for almost 20 years, will begin competing with the industry giant in the growing replacement parts market for unit record equipment.

The firm, a division of Becton, Dickinson and Co., which manufactures precision surgical equipment, has entered into a license agreement with IBM to manufacture, under its own

label, assemblies and components for keypunches.

Bard, which has been praised by IBM for meeting all quality standards for equipment, will continue to act as a vendor to IBM as well as other OEMs, a spokesman said.

During the past 15 years, Bard has produced subassemblies such as the 12-column die and stripper units for use in the IBM 024, 026, and 029 assemblies.

The company has also manufactured the 80-column die and stripper assemblies used in the IBM 514 reproducing equipment, mark-sense units, and the high-speed die and stripper assemblies used in the IBM 360, 365, and 4401 computers.

## Code Plate Assembly

Initially Bard will only be offering the code plate, print wire assembly, and the individual

print wire for the use with the 026 and 029 keypunches under its own label.

The print wire assembly and individual print wire are available now and the code plate will be on the market in mid-September.

The initial market for these items, the firm said, will be the replacement market made up of leasing companies, remanufacturing groups, service groups, and users that perform their own keypunch maintenance.

The equipment marketed by Bard-Parker will be "brand new," that is, just off the production lines. It will not be reconditioned or in any way

used, the firm said.

Although the equipment will be marketed to original IBM quality standards, company spokesmen said that it would be available for between 20% and 25% less than the prices quoted by IBM.

Even though this is the first move by the firm into the replacement parts field, spokesmen said that they hoped to identify the firm as a capable source "for additional related products aimed directly at the end user."

No future products were disclosed, but a spokesman said that future developments would be "in the form of peripheral equipment."

## Varian-Milgo Units Interfaced For Radar Trigonometric Processing Applications

MIAMI—A Varian Data Machine 520J minicomputer has been linked with a special Milgo Electronic Corp. trigonometric processor to solve complicated coordinate transformation problems.

The new Automatic Radar Data Control (ARDC) system developed by Milgo is being installed at the Fort Huachuca, Ariz., missile range to make spherical trigonometry calculations for designing radar antenna parameters to within 20 yards of range and 0.1 mil of angle.

The system is designed so that the 520J combines with the trigonometric processor to solve coordinate transformation range problems by transferring 24 bits of data bidirectionally without requiring complex programming routines, Varian said.

The Varian computer and the trigonometric processor allow the system to follow a target to the horizon. They then make the complex calculations needed to

tell another radar unit downrange exactly where to pick up the target on its own horizon and lock onto it.

### Coordinates Converted

This coordinate transformation involves breaking radar polar coordinates down into Cartesian coordinates, making a series of rotational calculations about each x, y, and z axis, and then transforming back into polar coordinates for the next radar system.

In the system two sets of hardware registers, including index registers, permit the 520J to run dual programs on an interrupt basis. A single 1.5 msec instruction transfers control between 24 bits of data bidirectionally without requiring complex programming routines, Varian said.

The system uses a high-speed optical printer for hard copy tabulation of all data, and an analog tape recorder for after-the-fact analysis.

changed.

The trigonometric processor is integrated with the 520J by means of a direct memory access port facility.

The configuration is such that the 520J's programming capability lets data be extracted from memory or placed into memory without having to interrupt the sequence of operations being performed.

The dual-register 520J in conjunction with the trigonometric processor allows the ARDC system to select from up to three inputs from another antenna downrange.

It also provides two outputs, one for another processor and one for a special range control system which maintains a plot-board display of the total system's activity.

The system uses a high-speed optical printer for hard copy tabulation of all data, and an analog tape recorder for after-the-fact analysis.

## Viatron Seeking Merger Under New Management

(Continued from Page 29)

Roger Phillips, Viatron's new president, made at the end of the month at the opening of the company's London branch.

Phillips said he foresaw the possibility of a substantial holding in the company being taken up by an outside industrial group—in other words, Viatron's new management is looking to be acquired.

Under Bennett's rule this would have been heresy, and contention over this point may have been the reason Bennett was replaced.

### The World in London

The reason for acquisition seems simply to be money. In London Phillips said there will be no cutback on European leasing policy and that the company plans to resume leasing in the U.S. as soon as financing is available.

Estimates of the amount of money needed to finance a leasing program range from \$30

million to over \$100 million, however, and Viatron, with its current credibility problem, apparently can't find it from banks or the stock market.

Therefore, acquisition.

### R&D Cutbacks

Phillips also mentioned that while the minicomputer is still scheduled for delivery in September, the OCR equipment may well be held back. Viatron also noted that development projects has been cut back in other areas, such as a desk calculator and a blue-key id for a document.

Admitting that the past Viatron has been over-optimistic, Phillips noted that the current economic climate has crippled the company as well.

He also said that while there may be an inventory of System 21, there is a backlog of orders for the computer compatible tape recorder, a key element of the system for any installation that needs to feed efficiently into a large computer.

## Herzing Charges Antitrust Violations Against ECPI in Computer School Suit

NEW YORK—A franchised computer school has filed a suit against the business practices of Electronic Computer Program Institute (ECPI), charging certain requirements are unfair

and constitute antitrust violations.

Herzing Institutes, Milwaukee, filed the suit in federal district court here, on July 15. The company, which started as an

ECPI franchisee, seeks approximately \$1.1 million in treble damages.

Company President Henry G. Herzing claimed ECPI's alleged refusal to allow the franchisee to use its own textbooks and classroom supplies constituted antitrust practices.

He also said that alleged maintenance of ECPI fixed price schedules at Herzing Institute violated certain antitrust rules.

ECPI countered that the suit is "without substantial merit," and, in a statement to shareholders, promised to "vigorously prosecute our claims" to collect sums due under existing franchise agreements.

The statement also suggested that the litigation might stem from "difficulty in enforcing certain clauses" of the agreement with Herzing Institutes, also a publicly owned firm.

The plaintiff owns a dozen technical schools, 11 computer schools and a recently acquired electronics institute.

The company has franchises mainly in the Midwest and Canada. After issuing its stock at \$10 last year, the price dropped, before-dropping 60% to \$8 last July.

## University Computing Sets Interface Division

DALLAS—University Computing Corp. moved another slice of the huge computer pie recently when it announced that it will begin to manufacture interface cable equipment to link different manufacturers' equipment.

The firm said it has established a special products development group within its System Support Division to develop devices to link both computers and computer peripheral equipment with different manufacturers.

In addition to designing specific products to link specific equipment with that made by different manufacturers, the group will also be capable of tailoring interface equipment for particular system configurations, according to Edward F. Kearns,

Systems Support Division president.

By using the group's promised multiplexers, special digital controls, interprocessor controllers and peripheral equipment interface, Kearns said a user will no longer need to be limited to originally compatible equipment.

### Huge Computerized

HANOVER, Pa.—Even dogs are being computerized now in an effort to produce better meat.

Ever since the Eastern National Spring Hog Show was reorganized in 1967, all the animals in the contest are weighed, measured, and rated.

This information is stored by computer programs with the cooperation of the DP center at the University of Maryland.

## Survey Shows Users Seek Improved Capture Units

(Continued from Page 29)

tion weight of 19.3, closely followed by reliability (18.8) and purchase (18.8).

Support and maintenance receive a selection weight of 14.6 while internal staff satisfaction is only given a weight of 10.5 and human engineering considerations only receive a weight of 9.4. Vendor reputation gets a weight of 1.0.

Of the sites surveyed, 45% indicate that they are either presently (13%) or planning (32%) to implement source data capture, but a great deal of maneuvering room is left as to the methods.

When asked what type of equipment they planned to use for source data capture, 34% indicated that they were uncertain. CRTs was the preferred method by 19%. Typewriters by 12%, typewriter units by 8%; keypunches by 7%; Teletypes by 6%, 1050s by 4%, with the remaining 10% spread over MICR, OCR, etc.

From these results it appears that users are not locked in to any particular technology for their source data capture equipment and are waiting for new methods that will solve their particular problems.

A.B. Williams, an International Data Corp. analyst here, commented on the survey results. "Users are looking for a leader. Here's NCR with a lot of cash registers in use—very profitable things—and IBM in the same position with keypunches. They're not going to kill the goose that laid the golden eggs until they're good and ready."

"In the DP center, input has progressed from keypunch to mag tape to its current state—key-to-tape or disk, OCR and data collection."

"What can we expect as the eventual replacements? Well, NCR should have a terminal register device waiting in the wings; IBM makes the Selectric typewriter, and can add magnetic card or tape enhancement."

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# The Great Memory Debate—Part II

## Honeywell Plated Wire Aims at Aerospace Dominance

By William A. England  
Special to Computerworld

Despite what you might have heard, or been led to believe, plated wire is alive, well and living in the military and aerospace memory market. And, doing quite nicely.

It even seems to have recovered from a somewhat chronic earlier case of "challengitis,"—brought on by eating the countless trade press headlines reporting how this, or that, company's plated wire memory was about to beat core and semiconductor memories at their own game. Although a majority of these previous claims appear to have been premature at best, in the past year or two, plated wire has made solid progress toward full acceptance and wide application in non-commercial areas.

Today this perennial challenger stands as a realistic competitor in the aerospace marketplace. Present 5-mil diameter plated wire technology, and next generation improvements, such as Honeywell's 2-mil-MISC combined Mini-Wire memory system, have their sights set on the lion's share of the estimated \$100-million annual military and aerospace memory market that has been previously well guarded by standard 20-mil core systems.

Companies such as Goddard Aerospace, Honeywell, Raytheon, and Unisys simply aren't happy with the 10% market share plated wire has accumulated since 1967. They are openly after more.

The strength of their efforts to advance technology and memory sales may surprise those who have heard only the negative side of the plated wire story.

### Problems Discussed

There's no doubt the technology has had its share of problems—the most far reaching of which has to be cost considera-

IS the international marketplace the key to success in the computer industry at a time when things aren't going so well here at home?

The current Gray Sheet probes this concept as it examines the world of the computer outside the U.S. Send for the current issue — \$8. Or, go ahead. A year's supply only costs \$75.

**IEDP industry report**

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tions. In today's business environment price is undoubtedly the most important parameter. There's also no denying that in the past plated wire hasn't been cost competitive with core systems over the broad spectrum of applications.

Some of the doubters continue to tell a plated-wire version of the old "which came first, the chicken or the egg story." It goes like this:

Plated wire (in either military or commercial application) won't be competitive until it lowers its per-bit price.

Its cost-per-bit price can't be lowered until it achieves increased production.

Increased production isn't possible until plated wire wins roles

on new and more important programs.

Important programs can't be won until it lowers its cost-per-bit... ad nauseum.

To those who are inclined to believe such an "eco-technological" fairy tale, it doesn't seem to matter that plated wire has achieved its present military and aerospace position on a cost/performance ratio that has satisfied customers. Honeywell's first-generation 5-mil plated wire memories qualified for use in the Poseidon missile computer back in 1967. Since that time, numerous satellite applications, space telemetry roles on programs such as Titan and Apollo, as well as the Minuteman III guidance, computer have "gone

plated wire." Honeywell makes no secret of the fact that it considers Mini-Wire competitive with military core, in production quantities at the present time.

Aerospace and military applications are, of course, natural environments for the inherent strengths of plated wire. Its non-volatility, NDRO (non-destructive read out), high-speed, light-weight, low-power and high-packaging density, fit the environment like a glove.

Two of these characteristics, non-volatility and NDRO, have also played a major role in limiting core and semiconductor systems from use in some military applications.

Volatility in itself is a prime factor holding back the wide

application of semiconductors in the aerospace environment. The necessity to keep these units in a "power on" mode to avoid losing stored data during power interruption complicates the problems of standby power supply, transportation and their susceptibility to interference and noise.

The advantages of plated wire are even more pronounced when one examines what is available today in the 2-mil Mini-Wire system. Here, 200,000 bits of information can be economically packaged in a 120-cubic in. package weighing about 4.5 lb. It offers 500 nsec write and 250 nsec read while operating on only 18 W.

### Main Contribution Seen

Perhaps its biggest single contribution, however, has been the combination of a magnetic plated wire element, with all MISC electronics.

Mini-Wire stacks up well when

This is the second of four planned articles examining the various technologies available to the OEM purchaser of memory components. Last week semiconductor systems were examined and next week we will look at core memories.

William A. England is a member of the advanced planning group at Honeywell's Aerospace Division in St. Petersburg, Fla., and, as such, places heavy emphasis on the future of plated wire in the aerospace/military market.

As England has noted, developments in the military and aerospace markets seem to have a habit of finding their way into commercial use, especially in a firm like Honeywell which is active in both areas.

compared to the "Big Daddy" of the military memory world—the 20-mil core.

Mini-Wire with a read speed of 250 nsec and write speed of 500 nsec offers a 4:1 improvement ratio over 20-mil cores in current use which have read speeds of about 2  $\mu$ sec.

In power requirements, plated wire, which needs 18 W, offers a 3:1 improvement over the 65 W for cores, while the 120 cubic in. size is a more than 2:1 improvement over cores' 300 cubic in. In weight, plated wire also offers a 2:1 improvement ratio.

Looking ahead, there's no doubt that plated wire will be the one memory element that sees application in a broad spectrum of aerospace memory markets. The future home of plated wire systems will cover the small capacity, very high speed (up to 100 nsec) scratched memory, medium speed to high speed (500 nsec) main memories, electrically alterable, read-only memories (250 nsec range), and the slower speed mass memories.

With these applications, plated wire should be able to tie up about 50% of the military and aerospace market by 1975.

## Memory Contenders Line Up for Photos



An engineering breadboard of a plated wire memory under test at Honeywell's Aerospace Division, St. Petersburg, Fla., is shown at top left. The breadboard packages 8K words by 24 bits into 170 cubic in., Honeywell says. The Cogor Corp. semiconductor memory shown above is a 4 in. square monolithic system with an access speed of 125 nsec and a capacity of 512 words by 8 bits, according to the firm. The Cogor unit is on top of a ferrite memory and Cogor claims that its unit offers more than 20 times the density and 10 times the performance of the 1.5  $\mu$ sec ferrite memory. The Electronic Memories Division of Electronic Memories and Magnetics submitted the photo of the cores at the lower left.

## INTERNATIONAL DATA CORPORATION

Announces Completion of its  
EDP Industry Outlook Study

For Corporate Planning Service Sponsors, This study examines fundamental user demand, relates it to economic indicators and utilizes the IDC Industry Model to project the computer industry's outlook for 1970-1975. Special attention is given to the current economic slowdown and impact on user spending plans.

Information about the Planning Service may be had from:

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IDC is the largest market data gathering, research, and consulting firm in the computer industry.



# PDP-11/20 Used in GEOS System for Nuclear Work

HAMDEN, Conn. — A Digital Equipment Corp. (DEC) PDP-11/20 has been teamed with a single or dual parameter 4, 096-channel analyzer for nuclear research and analysis by GEOS Systems Technology Division of Geoscience Instruments Corp.

The Quanta System gives the experimenter the operating ease and data acquisition efficiency of a hardwired multichannel analyzer combined with the stored program and data reduction capability of the computer, GEOS Systems said.

The hardware control simplifies experimental set-up, on-line display monitoring, and operator interaction with the system, William J. Mayer, GEOS manager of marketing, claimed.

"Software control in the system permits the implementation of sophisticated data reduction techniques, the automation of experimentation, and other

types of operations not feasible with hardwired instrumentation," he noted.

## Used as Extension

With the Quanta system, the analyzer memory, in addition to its normal functions, can be used as an extension of the PDP-11/20. For example, a PDP-11/20 with 4,096 16-bit word read/write memory can use up to 8,192 words when operating with the analyzer memory.

Up to four analyzers can be linked to a single PDP-11/20 having a 4,096-word read/write memory. This permits central processing of data from each of the analyzers and makes up to 16,384 words of read/write memory available to the computer via direct memory addressing.

With this arrangement, the computer memory can also be augmented with 8,192 words of read/write memory, making a

total of 28,672 words available through direct memory addressing.

Integration of data comprising a radiation energy spectrum or a selected spectral peak can be performed either with or without automatic background subtraction. Spectrum stripping (energy isolation) can be accomplished with automatic energy

and intensity normalization.

This minimizes or, in some cases, eliminates the tedious trial-and-error manipulations and energy calibrations required by manual spectrum stripping techniques, GEOS claimed.

A program that enables the experimenter to tag spectral

peak locations during data accumulation is also provided, so that upon completion of data accumulation, the tagged peaks can be integrated and read out for experimental records.

System prices begin at less than \$30,000. Deliveries are made 45 days after receipt of an order.

## PEC Transports Being Delivered Under OEM Pact

CHATHAM, Calif. — Peripheral Equipment Corp. has begun deliveries of its Model 6800 Series tape transports to Computer-Machinery Corp. under a \$1.4 million OEM pact.

The transports will be integrated into the CMC's Key-Processing Systems, a computer-controlled keyboard input system which can handle up to 32 individual keystrokes operating independently on different jobs simultaneously.

The PEC Model 6840 transport is designed for use in mass storage and sequential access applications. It features a 60KHz, 1600 cpi data transfer rate.

The transports have read-after-write dual stack heads and operate at speeds of 37.5, 25, 18.75, or 12.5 ips. Rewind speed is 150 ips. CMC will use both the 9- and 7-track configurations of the 6840.



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words on a 4-track continuous-loop cartridge that also eliminates handling problems common to paper tape. That's efficiency. For the low price of a TP-1351 you can't afford not to use magnetic tape with your mini-computer. All for under \$2,000. That's economics. Write or call for complete information on the Tannecomp TP-1351 Magnetic Tape Unit and other peripheral computer products.



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## Los Alamos Lab Accepts CDC 7600 After Testing

LOS ALAMOS, N.M. — A Control Data Corp. (CDC) 7600 system operated at 96.3% up-time during a month-long performance test at the Los Alamos Scientific Laboratory, the firm claims.

The AEC Laboratory, which will use the huge machine in conjunction with three CDC 6600 systems in nuclear research

programs, officially accepted the machine after completion of the tests, CDC said.

Total elapsed time between shipment of the 7600 from the firm's advanced development laboratory in Chippewa Falls, Wis., and formal acceptance was less than two months. The system was cabled and powered up within eight days of its shipment.

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## Potter Promises Product Line In 96-Column Card Equipment

PLAINVIEW, N.Y. — Potter Instrument Co. has announced the first two products in what is promised to be a line of 96-column card equipment for the OEM market.

Both products, the CS 8000 card sorter and the CR 8000 card reader, are based, Potter said, on a compact card transport designed for reliability, modularity, high speed and low cost.

The CS 8000 offers card sorting at 1500 card/min from an input hopper with 2,000 card capacity to six output stackers with 600 card capacity.

Sort functions include numeric, alphanumeric, and optionally alphabetic and selective sorts.

Based on the unique design of the Potter sorter, which allows all 96 characters to be read in one pass, the CR 8000 is available with a reader attachment, which will supply an interface suitable for connection to a CPU.

Through switch selection, the off-line sorter may then be converted to an on-line reader with reading rates of 1500 card/min synchronously or 1000 card/min on demand, while giving the CPU full control over the six output stackers.

The second System/3 peripheral device is a card reader, the CR 8000, with a reading rate of up to 1,500 card/min. This new reader, Potter said, will find many applications for reading the System/3 card in on-line, off-line, and communications applications.

Optionally available on both devices is the ability to read the

Potter Magnetic Character Bar Code. With this code, 128 characters can be stored on the standard System/3 card, a 25% increase in the quantity of data.

All magnetic character output data is both man- and machine-readable and can be prepared on an office typewriter by personnel unfamiliar with data processing hardware.

To meet the OEM's requirements these units are available either free-standing or for packaging with OEM hardware.

Both the sorter and reader are currently in the prototype stage of development. Prices and delivery schedules have yet to be determined.

Potter Instrument Co., Inc. is at East Bethpage Road.

## Photoplotter Designed For Printed Circuit Art

NEWPORT BEACH, Calif. — Manufacturers of printed circuits and others with precision artwork requirements can use a compact and totally self-contained photoplotter system that has been designed and produced by Universal Graphics Inc.

Called the Unigraph 22, the system has three modular units, a photoplotter, a developer, and an enlarger/printer. Each is said to be independent and available separately.

The total outside dimensions of the three combined modules are 97.5 in. by 28 in. by 68 in. high, enabling it to be moved through a 30 in. door.

Needing no darkroom, special environmental conditions, or expert installation, the system may be located anywhere in-plant where the production of PC masters is desired — the drafting room, engineering area or design group.

Universal claimed that the plotter provides consistent linear determination of .001 in.

The Unigraph 22 system is available for a one-time price of \$75,000, or under three- and five-year lease plans.

Universal Graphics Inc. is at Suite 905, 550 Newport Center Drive.



The Unigraph 22 system includes the photoplotter module with control panel, at left, the developing module, bottom right, and the enlarger/printer module.

## Egg Packing?

It may look like he's packing eggs, but the workman above is actually preparing semiconductor memories for shipment from an undisciplined Cogor plant. The firm's headquarters are in Wappingers Falls, N.Y.

## Kearfott Plans Size 8, Size 9 Commutator Motors

LITTLE FALLS, N.J. — Two dc motors, CMO 9600 003 and CMO 9600 002, are available from Singer-General Precision, Inc., Kearfott Division. The former, a Size 8 unit, and the latter, a Size 9 component, are both commutator type motors in which the field is supplied by a permanent magnet.

Exhibiting performance characteristics similar to constant speed series-wound motors, these units are said to feature greater efficiency by the elimination of field winding losses. According to Singer, they would be useful in miniature instrumentation applications where high efficiency and variable speeds are required.

Characteristics common to both motors include: 28 Vdc rated voltage; 125 ma max. no

load current; 254  $\Omega$  armature resistance; 1.6 gm  $\text{cm}^2$  rotor moment of inertia;  $-54^\circ\text{C}$  to  $+165^\circ\text{C}$  temperature range.

CMO 9600 003 has a stall current of 1.250 ma max, stall torque of 1.5 in. oz., 20,000 rpm no load speed; 66,000 rad/sec<sup>2</sup> theoretical acceleration, 2.5 V breakdown voltage, and weighs 1.5 oz.

CMO 9600 002 has a stall current of 1500 ma, 2.25 in. oz stall torque, 14,800 rpm no load speed, 99,000 rad/sec<sup>2</sup> theoretical acceleration, 3.5 V breakdown voltage, and weighs 2 oz.

Singer said that these motors are priced at \$15 to \$30 per unit, depending on quantity ordered.

Singer's Kearfott Division is at 1150 McBride Ave.

## EUROPE TODAY

Issue 14. IBM has announced the first models of System 370 and EDP Europa Report examines their likely impact on the market. The change in UK government may affect the technology based industries. The Honeywell-GE merger sets off other merger rumours. These are some of the items in EDP Europa Report Issue 14.

Order your copy of EDP Europa Report Issue 14 now, at the non-subscriber price of \$5 (£1. 15s) USA, \$3.35 (£1. 8s) Europe and have its full value accredited to an annual subscription for 24 issues \$65 (£27) if taken up within two months. Orders may be placed at either of the following offices.

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## Five New Keyboards From Datanetics Will Feature MSI

REDONDO BEACH, Calif. — A line of five standard low-profile, MSI encoded keyboards, for communications and data entry terminals, has been announced by Datanetics Corp.

Designated the DC Series, the keyboards incorporate the elastic diaphragm switch concept, and are offered in 13 in. and 15 in. frame, 49 to 71-key models for dual and tri-mode operation.

Features incorporated in these models are: two-key rollover, double-hot molded keys, electronic or mechanical shift lock, stepped or sloped keyboards, and fully buffered outputs.

TTL/DTL compatible MSI encoding circuitry provides up to 8-bit (parity) encoded output.

Interface to existing equipment is accomplished through a single standard card edge-termination. These models are designed to be directly interchangeable with currently available conventional keyboards.

All keyboards are said to have low power requirements — +5 Vdc  $\pm$  10%, at 250 mA max. Key operating force is 3  $\pm$  1/2 oz, with a stroke of 0.187 in.  $\pm$  0.015 in.; key life is rated at more than 100,000,000 operations. Operating temperature range is 30°F to 125°F.

Prices for the 13-in. frame models range from \$150 to \$160, in lots of 100. The 15-in. models sell for \$175 to \$190, also in quantities of 100. All models are currently available two weeks ARO.

Datanetics Corporation is at 2828 Spectre Lane.

## Honeywell CCD Set To Offer Memories In 60 Core Varieties

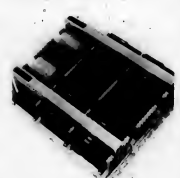
FRAMINGHAM, Mass. — Honeywell Inc.'s Computer Control Division (CCD) has introduced a modular IC core memory system that can be altered to produce 60 different configurations.

The ICM-161 system can be expanded or reconfigured at the installation site, CDC said. Available in 4K word sizes up to 16K word capacity, its word lengths come in 8, 12, and 16-bit formats.

The basic system is organized for random access addressing and operates on a full cycle time of 1.6  $\mu$ sec with a 650-nsec access time for read/regenerate and clear/write operations. Other addressing modes available include random sequential and sequential interface.

Large capacity configurations are priced at 3 cent/bit if purchased in quantity. Delivery schedule for the ICM-161 is 30 days. Shipments will begin immediately.

Honeywell Computer Control Division is at Old Connecticut Path.



Computer Control's New ICM-161

## New OEM Products

### NAR Announces a First

ANAHEIM, Calif. — A 1024-bit, four-phase, dynamic shift register is the first "standard" MOS/LSI device available from the new North American Rockwell Microelectronics Co.

Employing P-channel enhancement mode transistors, the unit features power dissipation rate of under 0.15 mW/bit at 1 MHz and a frequency range from 10KHz to 1 MHz. It has two protected inputs for a delay of 1023 or 1024 bits with a push/pull dc output.

Standard configurations carry a price tag of less than one cent per bit in quantities above 50,000 and standard devices can be customized for various bit lengths, NAR said.

The firm is located at 3430 Mirolama Ave.

### Analog Adds Converter

CAMBRIDGE, Mass. — Analog Devices, Inc. claims its new Model ADC-12Q successive approximation 12-bit analog-to-digital converter is applicable to data acquisition, digital communications, digital recording, on-line digital control, simulation and similar uses.

The unit is based on a uDAC monolithic IC quad switch and thin film resistor components, AD said. The unit has 12 bit resolution, 0.0125% relative accuracy (including buffer amplifier and comparator errors), 20  $\mu$ sec conversion time and an operating temperature range of -55°C to 125°C.

Digital outputs from the unit are TTL compatible and include such codes as binary, BCD, two's complement, and

offset binary. The ADC-12Q is priced at \$305 in units or \$244 in 100 unit lots.

Analog devices is at 221 Fifth St.

### Oppenheimer Displays Readout

WILLOW GROVE, Pa. — A new alphanumeric readout display from Oppenheimer Inc. features miniature size (character 0.40 in. by 0.40 in., 500 foot lamberts average brightness at 5 Vdc, front relamping, and a choice of colors and filters.

The Opacite display is relampable from the front of the unit and the readouts can be mounted side by side on 0.675 in. centers. A decoder/driver board is available that uses a 5 bit binary coded signal at TTL logic levels.

Oppenheimer is at 2475 Wyandotte Rd.

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# 'Gateway' Growth Given From Only Sketchy Surveys

By Edward J. Bride

CW Staff Writer

**JERSEY CITY, N.J.**—This city calls itself the Gateway, much because the Statue of Liberty is located within city limits, and partly because it is just across the Hudson from Manhattan.

The Gateway City's Area Development Council boasts of rapidly expanding EDP facilities, skimming over the fact that growth figures are based on returns from only two sketchy surveys.

For example, a recent report

noted that in 1967, 15 of the 26 respondents utilized computers. In 1970, with nearly 600 varied industries, including 100 trucking firms homesteaded here, only 44 addresses responded to the survey, with a healthy 75% reporting they used computers.

The report notes that these figures represent responses from 80% of the "banks, schools and industrial plants... who were mailed forms."

The council also boasts of computers and peripherals as if to say that having a spare tire, plus

four regular tires, plus a radio and a car were the equivalent of having seven cars.

Read the small print, or the grey print in the report, to get the true picture.

You will find that, "In 1967, firms responding reported 21 computers in use in the city. In 1970 there are 12 makes, 65 models, and 201 computers in use in Jersey City."

## Anything Is a Computer

If you follow the suggestion to consult an associated table, you discover the following "com-

puters" listed:

- 15 ADR multiplexers.
- 50 (approximately) IBM card punches, readers, or interpreters.
- 40 (approximately) pieces of MAI equipment of the same nature.
- 1 Univac card reader.

The report intends to assess Jersey City's progress by noting the growth in its computer community.

This assessment is aimed at attracting more businesses which might be looking for a place to relocate.

Even a supposed shortage of computer personnel, eased partly because of progress in optical scanning, is presented in a positive manner.

Yet figures show the high and low pay of computer-operator trainees to be more than programmer trainees. As a matter of fact, the lowest-level operator-trainee makes 20% more than the lowest-level operator, according to the report.

Other figures presented to impress businesses include a list of 15 electronic devices which local companies planned to add in 1970. The list includes an IBM reader, a line printer, a telephone, some memory devices, a disk drive, and a "Control Data" PDP-10!

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## Navy-Released Forecast Covers Upcoming Buys

CW Washington Bureau

**ARLINGTON, Va.**—A tentative advance procurement plan issued by the Navy's Automatic Data Processing Equipment Selection Office here calls for the procurement of 22 large-scale computer systems during fiscal year 1971, as well as one medium-scale system, three small units, and a number of Fast-track-compatible drum storage devices.

The procurement is divided into quarterly segments, which are to be updated in approximately three months. Specific information is provided to contractors on the official mailing list about a month prior to issuance of the actual request for proposals.

The largest procurement is planned for the fourth quarter of fiscal year 1971, when the Naval Ship Systems Command plans to replace existing installations with 11 large-scale computers at Casco, Boston, Mass., and at 10 Naval shipyards throughout the country.

The Chief of Naval Material plans to replace two IBM 1401s, one NCR 315, one each of RCA 301, 501 and 3301, and an IBM 360/50 with a single large-scale system with remote terminals at several Washington, D.C. locations.

The Naval Research Lab in White Oak, Md., will replace two CDC 3800s with another large-scale system, and a medium-scale machine is planned for the Naval Oceanographic Distribution Office in Clearfield, Utah.

Small EDP systems will be installed at the Dept. of Defense Computer Institute, Washington; the Medical School, Bethesda, Md.; and one each for the Bureau of Medicine and Surgery facilities in Great Lakes, Ill.; Camp Lejeune, N.C.; Charleston, S.C.; San Diego, and Agaña, Guam.

The Naval Supply Systems Command will also replace a number of Univac Fast-track II drums with compatible storage devices at several locations.

The Navy's Automatic Data Processing Equipment Selection Office is the only contract for information about the proposed contracts. The forecast is issued every three months by the organization.

## Year-End Report Released

## L-T Loses Over \$28 Million; Bonanza Is Repossessed

NEW YORK — Levin-Townsend and Computer Corp.'s first release of its long-awaited year-end financial report was followed last week by the announcement of the foreclosure of its biggest loser — the Bonanza Hotel and Casino in Las Vegas, Nev.

The firm's gamble on the Bonanza Hotel and Casino came up "snake-eyes" when a \$3.9 million loan on the property was foreclosed and the property repossessed.

Tracy Investment Co., announced right on the heels of the year-end report that it had foreclosed on a \$3.9 million loan to Levin-Townsend and repossessed the Las Vegas gambling emporium.

The loan was for not even half of the \$10 million that Levin-Townsend had paid for the

establishment at the end of the 1968 fiscal year.

Levin-Townsend said that it had stopped paying interest on the note about April 1 and that Levin-Townsend had been unsuccessful in finding a buyer for the property.

The gambling portion of the establishment had been closed since March under a loan re-financing agreement with IBM and the hotel section had been boarded up since last month.

The firm, which has been in the casino business for just over a year, had just released its financial statement for the year ended March 31, and no matter how it's colored it comes out red.

The belated year-end report showed a loss of \$28,769,020 which equaled \$8.70 per share

for the year. Last year the firm earned \$13,183,845 or \$3.71 per share.

Revenues also tumbled in 1970 from the \$68,636,479 reported in 1969 to \$62,352,094.

## Operating Income

Operating income from continuing operations, before gains and losses from investments and extraordinary items, totaled \$5,459,000 or \$1.65 per share, compared with \$11,391,000 or \$3.68 per share in the previous year, the firm said, however.

After providing for losses of \$5,138,000 on investments, and \$2,785,000 from operations that were discontinued or are in the process of being discontinued, a net of \$2,464,000 or 75 cents per share was registered, the firm added.

Operations which have been or are in the process of being discontinued relate primarily to the

firm's interest in the Bonanza hotel and real estate operations in Las Vegas, as well as computer programming and service center operations, Levin-Townsend said.

The extraordinary losses on the balance sheet, however, total \$26,305,000 or \$7.95 per share. Of the extraordinary items, \$10.1 million is related to write-offs for the Bonanza, \$7.6 million to write-down on the company's interest in Nevada real estate, and \$8.7 million related to the write-off of goodwill not considered to have continuing value, according to James E. Townsend, president.

Townsend stated that with the write-off of a \$1,054,000 write-off for goodwill in Levin-Townsend Service Corp., all other write-offs and losses for the year were attributable to Levin-Townsend Enterprises Inc., a subsidiary with interests

in fields outside the computer business.

## Leasing Activities

Townsend said that "for all intents and purposes," the firm has withdrawn from those areas which have caused substantial losses and write-offs. What remains, he said, is the company's computer leasing activities, certain real estate operations, administrative and actuarial consulting and other activities.

The firm, which recently announced plans to pay off its \$20 million in overdue debts to IBM (CW, July 22), currently has a computer equipment portfolio that totals in excess of \$18,489,000, Townsend said. In addition, he noted that the firm still has short-term indebtedness, some of which must be refinanced.

## Computer Applications Agrees on Volt Merger

NEW YORK — Computer Applications Inc. (CAI), the much beleaguered programming and services concern, has agreed to merge with Volt Information Sciences Inc. through the exchange of CAI stock valued at nearly \$35.8 million for Volt shares. Volt offers services including engineering, training, data processing, graphics, marketing and temporary personnel.

Having shed several holdings of its in an effort to provide working capital and reduce short-term debts, CAI also announced the sale of its profitable publishing and graphic arts activities to Lambda Corp., a private concern, for an undisclosed amount of cash.

The proposed merger with Volt, pending approvals by stockholders of both companies and acceptance by holders of at least 80% of CAI's outstanding debentures of an offer to exchange equity securities for the debentures, apparently would put a majority of CAI stock in the hands of Volt shareholders.

Proposed terms call for CAI outstanding common, totalling

about 1.7 million shares, to be "reverse split," or reduced by a ratio of two shares for 13, slicing the number of outstanding shares to about 261,500.

Volt shareholders then would receive one new share of CAI common for each three Volt shares. The companies said this would require issuance of about two million new shares, adding that details of the exchange offer would be announced shortly. CAI, which reported a net loss of \$9.8 million on revenue of \$20.1 million for the first half, ended March 31, recently turned over its systems and programming activities to Programming Methods Inc. for an undisclosed amount of cash.

Earlier, CAI had closed Speedata, a subsidiary which had compiled losses in excess of \$17 million.

In the year ended last Sept. 30, CAI sustained a net loss of \$10.1 million on revenue of \$41.9 million.

Volt reported net income of \$417,400 on revenue of nearly \$10 million for the first quarter, ended Jan. 31.

## Control Data Assembly Plant Set for Canada

MONTREAL — A new \$40 million computer facility is being planned by Control Data Canada Ltd., a subsidiary of Control Data Corp.

The proposed computer assembly plant will be built near Quebec City and, according to Jean Labonte, director general of industrial development for Quebec, was chosen because of the availability of female labor. It is expected that 70% of the plant's employees will be women, both skilled and semi-skilled.

Labonte indicated building costs would be covered in part by federal grants from Canada's industrial incentive program.

In Minneapolis, a spokesman for Control Data, which suffered control operations first half deficit of \$12.3 million, said the company was negotiating with the Canadian Government on a "cooperative project" but he declined to comment on the size or exact location of the proposed facilities.

Labonte also said Toronto could supply much of the scientific resources for the research facilities.

Quebec would not be providing any financial assistance, Labonte noted. However, he said federal and provincial programs would complement each other. No date was given for start of plant construction.

## ADR Sets Plans to Sell Programmatics To CMC, Reports Reduced Quarter Loss

PRINCETON, N.J. — One of the firms using IBM on antitrust violations may drop out of the race.

In a spate of financial activity which included the announcement of the second quarter report, Applied Data Research Inc. reached an agreement in principle for the sale of Programmatics Inc. to Computer Machinery Corp. in Los Angeles. Both ADR and Programmatics had filed suits against IBM on antitrust charges. But the firm's suits might be dropped by CMC.

## Looking at It

James K. Sweeney, CMC president, told CW that "We are appraising the current litigation by Programmatics against IBM on antitrust charges. We do not intend dropping it now, but we are certainly looking at it."

Some industry observers feel that the acquisition would mean a very beefed-up product line from CMC.

As one said: "It's hard to tell what the hell CMC wants with a sophisticated programming crowd like they have at Programmatics. The crowd doesn't fit

their image unless they really have a deal underway or have new ideas."

Acquisition of Programmatics by ADR over a year ago was also supposed to have been one of the differences that cropped up between the ADR directors and former ADR President Richard Jones.

Some industry observers felt that Jones' acquisition policy was the reason for his ouster by the board.

The announcement was made by John Bennett, president of ADR, David Ferguson, president of Programmatics, and James K. Sweeney, president of CMC. The terms of the purchase agreement were not disclosed.

The Programmatics subsidiary, headquartered in Los Angeles, specializes in systems programming such as the development of large business-oriented compilers and other software products such as PivSort for the IBM 360 computers. Programmatics was founded in 1963 by David Ferguson.

## Originator

CMC is the originator of the keyprocessing system concept

## Computer Unit Planned For Venezuela by UCC

DALLAS — University Computing Co. has confirmed reports that an agreement in principle has been reached with the Mendoza group of industries to form a computer utility company in Venezuela.

The Mendoza enterprises are a group of 60 diversified companies with annual sales of some \$200 million. The present agreement in principle contemplates that the new company will be organized as joint venture by UCC and the Mendoza group, with ultimate ownership to be

held in roughly equal parts by UCC, the Mendoza interests and the Venezuelan public.

The new computer utility will be modeled on those operated by UCC in the U.S. and in Europe. Additionally, it is contemplated that the new company will market UCC's remote computer terminals and other computer equipment under international distributor agreements.

Actual computer utility operations by the new company are targeted for early 1971.

and manufactures computer-controlled keyprocessing systems for the replacement of keypunch and key-to-tape devices. More than 70 CMC systems have been installed throughout the U.S. and abroad.

Commenting on the proposed acquisition of Programmatics, Sweeney said that the programming expertise of Programmatics will complement the present programming product development for keyprocessing systems as well as for new products to be announced by CMC.

About the same time John R. Bennett, president of ADR, reported that operations of the company were profitable for May and June and second quarter losses were substantially reduced from the first quarter level.

The company reported a net loss for the quarter ended June 30 of \$48,000 or 5 cents a share, compared with a net loss of \$306,000 or 32 cents a share for the quarter ended March 31.

Operating revenues for the second quarter of the year totalled \$1,924,000, an increase of 42% over the first quarter revenues of \$1,352,000. Proprietary software sales increased to \$939,000 for the second quarter, compared with \$352,000 for the first three months of the year.

Commenting on the marked improvement in operations, Bennett stated that the company had essentially met its goals for the second quarter. "In May, we projected that second quarter operations would be at an approximate break-even level. We believe that we have met this goal."

## Farm Data Bank

OMAHA, Neb. — Omaha has been selected as the site for the newly selected Farm Data Bank Data Bank. The data bank will utilize computer technology to provide management information and to do farm loss research on a national scale.

## Gloom Clouds Some Firms ...

# But Three Software Houses Show Signs of Sunshine

Despite the gloom that has shrouded many of the leaders in the software business with the announcements of dropping earnings and weary revenues, there are still some rays of sunshine.

Some of the major names in the business (Computer Sciences Corp., Computer Applications Inc., Computer Usage Co., etc.)

seem to be having trouble reaching the earnings levels chalked up in the past.

Three of the firms in the business—Informatics Inc. of Canoga Park, Calif., Programming Methods, Inc. of New York, and Logicon, Inc. of Los Angeles—are charting record or near record quarters, however. For the first quarter of its

1970 fiscal year (ended June 27) Informatics announced earnings of \$56,000 (4 cents per share), an increase over the loss of \$121,000 (8 cents per share) registered in the first quarter of 1969.

The improvement came on gross revenues of \$4,730,000 in the 1970 quarter, which topped the \$4,185,000 announced for the equivalent period last year.

### Profitability

Dr. Walter F. Bauer, Informatics president, reported that custom services "continued with overall strength and profitability."

"Of special significance," he added, "is that Informatics has received new contracts with the Advanced Research Projects Agency and the National Institutes of Mental Health." These are the first contracts landed by Tisco in addition to its facilities management pact to operate NASA's Scientific and Technical Information Facility.

Bauer also noted that changes in Informatics data center operations resulted in a "reduced rate of loss" for the quarter and stated that for the past five quarters sales of the proprietary Mark IV program have increased.

Programming Methods, Inc. reported record revenues and earnings for both the second quarter and first half of fiscal 1970, which ended June 30.

Income for the quarter hit \$139,542 (17 cents per share) on revenues of \$1,479,361, compared with last year's earnings of \$96,941 (12 cents per share) on sales of \$1,134,286 in the same quarter.

For the six-month period, revenues increased to \$2,760,899 from the \$2,164,055 announced a year earlier. Income was \$261,664 (31 cents per share), an increase of 37% over the \$191,077 (23 cents per share) charted in the first six months of 1969.

Programming Methods President George Langnas claimed the gains, realized say through internal growth, reflect record achievement in both revenues and earnings by each of the company's four major groups: information services, proprietary software, management sciences, and systems engineering."

### Contribution

He noted that the proprietary software group continued to in-

crease its contribution to the net income of Programming, which is 74% owned by Sylvania Electric Products Inc., a subsidiary of General Telephone & Electronics Corp.

Logicon, Inc.'s fiscal 1971 first quarter was the best in the company's history, with gains being chalked up in revenues, earnings, and total number of employees, John R. Woodhall, president, told a recent stockholders meeting.

Contract revenues for the quarter were \$2,082,737, a 37% jump from the \$1,514,433 realized in the same year-ago period. Income of \$99,974 (12 cents per share) represented a 28% increase over the \$78,076 reached in the first quarter of the 1970 fiscal year, he said.

With 2400 employees—up 75 from the same time a year earlier—the company said that prospects for continued growth in fiscal 1971 are "excellent." Running against the current trend, the firm said that business with the Department of Defense "continues to exhibit strong growth and profitability and is expected to continue in the future."

## Computer Sciences Says Income Down for Quarter

LOS ANGELES—Computer Sciences Corp. (CSC) has reported earnings off more than 50% for the quarter ended June 26, despite a rise in gross revenues.

Operating revenues of the firm reached a level of \$26.7 million for the 13 weeks, with earnings of \$1,284,000, William R. Hoover, CSC president, said.

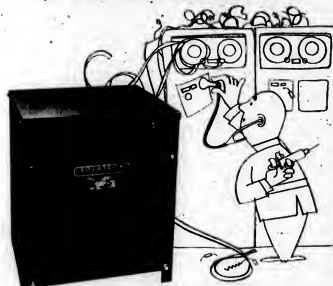
While revenues increased approximately 17%, reflecting the continued growth of the company's contract services business, earnings for the first quarter declined to \$1,284,000 or 10 cents per share, as compared with \$2,844,000 or 23 cents per

share a year earlier.

Several factors contributed to this earnings decline, according to Hoover, the most significant being a reduction in the more highly profitable sales of proprietary products and services caused by generally depressed economic conditions, with other factors being reduced investment tax credits and increased interest costs in the current quarter.

The firm's revenues increased almost \$4 million over the \$22.9 million chalked up in the same 1969 quarter. All of the 1969 figures are restated to account for acquisitions made on a pool-of-interest basis.

## R for Brownouts



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## Greyhound Earnings Lag In Second Quarter, Half

CHICAGO—Greyhound Computer Corp. (GCC) has reported that second-quarter 1970 profits held even with the preceding two three-month periods. But profits continued to lag behind year-earlier results.

Second-quarter profits were \$881,000 or 20 cents a share. For the six-month period, profits totaled \$1,739,000 or 40 cents a share, the firm said.

Profits for the comparable periods in 1969 were \$1,318,000 or 30 cents a share for the quarter, \$2,509,000 or 60 cents a share for the six months.

W. Carroll Bumpers, president and chief executive officer, said GCC revenues for the first six months of 1970 rose to \$24,765,000 from \$24,351,000 a year earlier. Second-quarter 1970 revenues declined to \$12,382,000 from \$12,490,000. He attributed GCC's first-half earnings decline primarily to the

loss of revenue on U.S. computer rental equipment during the "turnaround period" of the period between the time the equipment is returned by a customer and date it goes on rent to a new customer.

## Data Products Revenues Rise, Earnings Slide

LOS ANGELES—Data Products Corp. reported revenues up 8.5% for the first quarter of fiscal 1970, but noted slightly lower earnings from the comparable year-ago quarter.

Earnings in the quarter ended June 27 amounted to \$232,000 (4 cents per share) on sales of \$9,796,000, compared with income of \$318,000 (5 cents per share) on sales of \$9,989,000 for the 1969 first quarter.

Company President Erwin Tomasz said earnings were lower due to "continued high engineering costs associated with several major new product introductions." He also said the firm's backlog has jumped \$6 million to \$36 million from the \$30 million backlog at this time a year ago.

### Swift Helps Finance Co.

TOLEDO, Ohio—Dial Finance Co. has set up a System-Wide Information Field Transmission (Swift) system.

The system is designed to compute and process all the firm's transactions with customers, from writing checks to processing payments.

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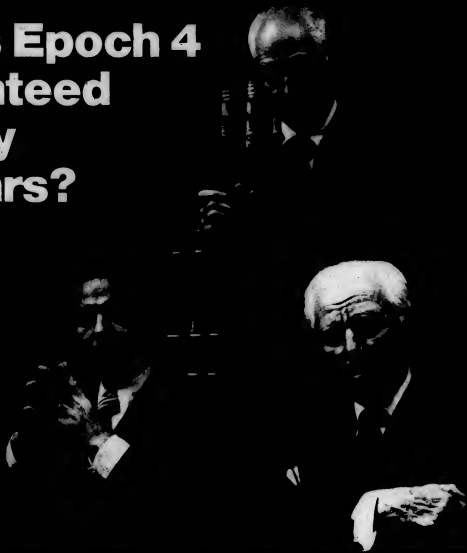
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# Computerworld Stock Trading Summary

TRADE QUOTES

| PRICE-<br>RANGE                            |                       |             |                    |               |                       |             | PRICE-<br>RANGE                                                                                                                                                                 |                       |             |                    |         |  |  |
|--------------------------------------------|-----------------------|-------------|--------------------|---------------|-----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|--------------------|---------|--|--|
| 1970<br>RANGE                              | CLOSE<br>AUG 6<br>(1) | WEEK<br>CHG | WEEK<br>PCT<br>CHG | 1970<br>RANGE | CLOSE<br>AUG 6<br>(1) | WEEK<br>CHG | 1970<br>RANGE                                                                                                                                                                   | CLOSE<br>AUG 6<br>(1) | WEEK<br>CHG | WEEK<br>PCT<br>CHG |         |  |  |
| SOFTWARE & EMP SERVICES                    |                       |             |                    |               |                       |             |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U ADVANCED COMP TECH                       | 1-3                   | 1 1/4       | 0                  | 0             | 0                     | 0           | 4 HURROGOS                                                                                                                                                                      | 75-131                | 93 3/4      | -3 1/4             | -3 1/4  |  |  |
| O APPLIED DATA RES.                        | 4-24                  | 4 1/2       | 1 1/4              | -1 1/4        | -5 1/4                | -5 1/4      | H CULLING RADIO                                                                                                                                                                 | 9-37                  | 33 1/4      | 1/4                | -1 1/4  |  |  |
| O APPLIED LOGIC                            | 3-10                  | 2 1/2       | -1                 | -1            | -7 1/2                | -7 1/2      | H CONTROL DATA CORP.                                                                                                                                                            | 50-122                | 53 7/8      | 1 1/8              | +5 1/8  |  |  |
| O ARIES                                    | 4-24                  | 4 1/2       | 1 1/4              | -1 1/4        | -5 1/4                | -5 1/4      | A DIGITAL EQUIPMENT                                                                                                                                                             | 50-124                | 56 5/8      | 1 1/8              | +5 1/8  |  |  |
| A AUTOMATIC DATA PROC.                     | 23-47                 | 29 7/8      | -2 1/4             | -1 1/4        | -6 1/4                | -6 1/4      | H ELECTRONIC ASSOC.                                                                                                                                                             | 3-11                  | 6 1/4       | 1/8                | -1 1/4  |  |  |
| U AU & D SERVICES                          | 5-14                  | 6 1/4       | 0                  | 0             | 0                     | 0           | A ELECTRONIC ENGINEER.                                                                                                                                                          | 3-14                  | 5 1/4       | 0                  | 0       |  |  |
| O BRUNNEN APPLIED SYS                      | 1-1                   | 1 1/2       | 0                  | 0             | 0                     | 0           | H GERRARD                                                                                                                                                                       | 9-32                  | 11 1/2      | 1/2                | -1 1/2  |  |  |
| D COMPUTER AGE INDUS.                      | 1-1                   | 1           | 0                  | 0             | 0                     | 0           | O GENERAL AUTOMATION                                                                                                                                                            | 9-32                  | 11 1/2      | 1/2                | -1 1/2  |  |  |
| D COMPUTER APPL                            | 2-12                  | 1 1/2       | 0                  | 0             | 0                     | 0           | H GUNTER                                                                                                                                                                        | 3-12                  | 3 1/2       | 0                  | 0       |  |  |
| D COMPUTER ENVIRON                         | 5-14                  | 3 1/2       | 1 1/4              | -1 1/4        | -2 1/4                | -2 1/4      | H HENLETT-PACKARD CO                                                                                                                                                            | 20-45                 | 22 3/4      | 1/8                | +0 1/8  |  |  |
| H COMPUTER INTRINSIC                       | 2-10                  | 3           | -2                 | -10           | -8                    | -8          | A HONEYWELL INC.                                                                                                                                                                | 85-152                | 82 3/8      | 7 5/8              | +0 5/8  |  |  |
| O COMPUTER NETWORK                         | 6-16                  | 8 1/2       | -1                 | -1            | -7 1/2                | -7 1/2      | H IBM                                                                                                                                                                           | 237-347               | 248 1/2     | -1                 | -1 1/4  |  |  |
| D COMPUTER PROPERTY                        | 6-16                  | 8 1/2       | -1                 | -1            | -7 1/2                | -7 1/2      | H ICH                                                                                                                                                                           | 18-33                 | 31 1/4      | 1/4                | -1 1/4  |  |  |
| H COMPUTER SCIENCES                        | 6-16                  | 8 1/2       | -1                 | -1            | -7 1/2                | -7 1/2      | H ICA                                                                                                                                                                           | 18-34                 | 24 1/2      | 5/8                | -2 1/4  |  |  |
| D COMPUTER USAGE                           | 6-16                  | 8 1/2       | -1                 | -1            | -7 1/2                | -7 1/2      | H ICHTECH CO                                                                                                                                                                    | 14-33                 | 30 1/4      | 1/4                | -1 1/4  |  |  |
| A COMPUTING & SOFTWARE                     | 18-75                 | 42          | -1                 | -1            | -4 1/2                | -4 1/2      | O SCI. CONTROL CORP.                                                                                                                                                            | 2-8                   | 3 1/4       | 1 1/4              | +7 1/4  |  |  |
| O CONRAD                                   | 4-10                  | 2 1/2       | 0                  | 0             | 0                     | 0           | N SPERRY RAND                                                                                                                                                                   | 21-40                 | 20 7/8      | -3 1/8             | -11 1/8 |  |  |
| D CONRAD                                   | 4-10                  | 2 1/2       | 0                  | 0             | 0                     | 0           | H SYSTEMS ENG. LABS                                                                                                                                                             | 10-40                 | 38 7/8      | -1 3/8             | -10 3/8 |  |  |
| U COSOL - ANAL. CENT.                      | 1-3                   | 7/8         | 0                  | 0             | 0                     | 0           | H VARIAN ASSOCIATES                                                                                                                                                             | 30-49                 | 10 1/4      | -3/8               | -5 1/8  |  |  |
| D DATA AUTOMATION                          | 2-12                  | 2           | 0                  | 0             | 0                     | 0           | A JAMM LABS.                                                                                                                                                                    | 18-51                 | 22 1/4      | 1/8                | -7 1/4  |  |  |
| D DATA PACKAGING                           | 5-29                  | 6 1/4       | -1                 | -1            | -10 1/2               | -10 1/2     | H XEROX CORP.                                                                                                                                                                   | 70-115                | 71          | -1 3/4             | -2 1/4  |  |  |
| D DATAMATION SERVICE                       | 5-29                  | 6 1/4       | -1                 | -1            | -10 1/2               | -10 1/2     | LEASING COMPANIES                                                                                                                                                               |                       |             |                    |         |  |  |
| D DATATAP                                  | 5-29                  | 6 1/4       | -1                 | -1            | -10 1/2               | -10 1/2     | O BIOTHE COMPUTER                                                                                                                                                               | 8-25                  | 8 1/4       | -1/2               | -7 1/2  |  |  |
| D DIGITEC                                  | 5-29                  | 6 1/4       | -1                 | -1            | -10 1/2               | -10 1/2     | U BREHMAN CORP.                                                                                                                                                                 | 3-9                   | 9 1/4       | 1/8                | -3 1/4  |  |  |
| D EMP RESOURCES                            | 5-29                  | 6 1/4       | -1                 | -1            | -10 1/2               | -10 1/2     | U COMPUTER EXCHANGE                                                                                                                                                             | 1-1                   | 1 1/4       | 1/4                | -1 1/4  |  |  |
| A ELECT COM PROG                           | 3-11                  | 3 1/2       | 0                  | 0             | -10 1/2               | -10 1/2     | O COMPUTER LEASING                                                                                                                                                              | 1-18                  | 5           | 0                  | 0       |  |  |
| D ELECTRONIC DATA SYS.                     | 31-162                | 16 1/2      | -1 1/2             | -1 1/2        | -1 1/2                | -1 1/2      | H DATA PROC. P & B                                                                                                                                                              | 6-32                  | 8 1/2       | 0                  | 0       |  |  |
| D ELECTRONICS                              | 4-21                  | 5 1/4       | 0                  | 0             | -18 1/4               | -18 1/4     | O GATONIC RENT                                                                                                                                                                  | 2-3                   | 7/8         | 0                  | 0       |  |  |
| A ETEL                                     | 8-26                  | 8 1/4       | 0                  | 0             | -18 1/4               | -18 1/4     | H GEARBOND COMPUTER                                                                                                                                                             | 10-24                 | 15 3/4      | -1 1/2             | -9 1/2  |  |  |
| D LEVIN-TOMSON SERV.                       | 1-13                  | 5 1/4       | -1 1/2             | -1 1/2        | -12 1/2               | -12 1/2     | O GIBSON CORP. LEAS.                                                                                                                                                            | 2-14                  | 3 1/4       | -1/4               | -3 1/4  |  |  |
| A HANDEL CORP.                             | 9-25                  | 9 1/4       | -1                 | -1            | -1 1/4                | -1 1/4      | A IMA, INC.                                                                                                                                                                     | 7-22                  | 9 1/4       | -7/8               | -3 1/4  |  |  |
| D HAT COMP ANALYSTS                        | 3-12                  | 6           | 0                  | 0             | -4 1/4                | -4 1/4      | A GREYHOUND COMPUTER                                                                                                                                                            | 5-44                  | 5 1/4       | -1/8               | -2 1/4  |  |  |
| O HMT CORP. SERV.                          | 3-12                  | 6           | 0                  | 0             | -4 1/4                | -4 1/4      | H HANCO DATA PROC.                                                                                                                                                              | 18-33                 | 31 1/4      | 1/4                | -1 1/4  |  |  |
| N HANSON RESEARCH                          | 15-58                 | 15 3/4      | 0                  | 0             | 0                     | 0           | U LECTRO COM LEAS.                                                                                                                                                              | 2-5                   | 3 1/4       | 0                  | 0       |  |  |
| U PROGRAMMING METHODS                      | 9-27                  | 10          | 0                  | 0             | 0                     | 0           | O LEVIN-TOMSON CORP.                                                                                                                                                            | 1-13                  | 5 1/4       | 1/4                | -1 1/4  |  |  |
| O PROGRAMMING & SYS                        | 2-5                   | 2           | 0                  | 0             | 0                     | 0           | H INC DATA, INC.                                                                                                                                                                | 1-3                   | 3 1/4       | 1/8                | -3 1/4  |  |  |
| D PROGRAMMING SCIENCES                     | 2-22                  | 2 1/4       | 0                  | 0             | -5 1/4                | -5 1/4      | O MANAGEMENT ASSIST                                                                                                                                                             | 1-4                   | 4 1/2       | 0                  | 0       |  |  |
| D SOFTWARE SYS                             | 2-22                  | 2 1/4       | 0                  | 0             | -5 1/4                | -5 1/4      | G MC LEASING                                                                                                                                                                    | 3-8                   | 7 1/4       | 0                  | 0       |  |  |
| D TEST COMPUTER CENTERS                    | 8-27                  | 8           | 0                  | 0             | -5 1/4                | -5 1/4      | U SYSTEMS CAPITAL                                                                                                                                                               | 1-10                  | 10          | 0                  | 0       |  |  |
| U UNITED DATA CENTER                       | 4-4                   | 4 1/4       | 0                  | 0             | -10 1/2               | -10 1/2     | O U.S. LEASING                                                                                                                                                                  | 3-10                  | 13          | 0                  | 0       |  |  |
| D UNIVERSITY COMPUTING                     | 15-99                 | 15          | -5 1/2             | -5 1/2        | -26 1/4               | -26 1/4     | EACH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE<br>U=UNITED STATES EXCHANGE; O=OVERSEAS EXCHANGE<br>U-T=PRICES AND BIDS PRICES AS OF 3 P.M. OR LAST BID<br>(1) TO NEAREST DOLLAR |                       |             |                    |         |  |  |
| A U.S. & S.                                | 2-11                  | 3 1/4       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D U.S. TIME SHARING                        | 5-14                  | 5 1/2       | 0                  | 0             | -3 1/4                | -3 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| PERIPHERALS & SUBSYSTEMS                   |                       |             |                    |               |                       |             |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H ADDRESSOGRAPH-MULTI                      | 21-62                 | 26          | 0                  | 0             | +1 1/4                | +1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H ALPHANUMERIC                             | 4-15                  | 4 1/2       | 0                  | 0             | -20 1/4               | -20 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H AMPER CORP                               | 4-15                  | 4 1/2       | 0                  | 0             | -20 1/4               | -20 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A AUTODATA                                 | 4-24                  | 4 1/2       | 0                  | 0             | -17 1/4               | -17 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O BOLT, BERKELEY & NEW                     | 3-11                  | 8 1/4       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A BUNKER-RAND                              | 4-14                  | 7 1/2       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A CALCOMP                                  | 11-31                 | 10 7/8      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O COMINTROUS                               | 3-15                  | 3 1/2       | 0                  | 0             | -6 1/4                | -6 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U COLORDATA INSTRUMENTS                    | 4-15                  | 4 1/2       | 0                  | 0             | -17 1/4               | -17 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D COMPUTER COMMUN.                         | 6-30                  | 6           | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A COMPUTER EQUIPMENT                       | 4-12                  | 4           | 0                  | 0             | -8 1/4                | -8 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A COMPUTEST                                | 13-28                 | 17 1/4      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A DATA PRODUCTS CORP.                      | 4-28                  | 4 1/2       | 0                  | 0             | -33 1/4               | -33 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A DATA TECHNOLOGY                          | 8-25                  | 6 1/4       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O DIGITALLOGICS                            | 5-15                  | 5           | 0                  | 0             | -4 1/4                | -4 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D ELECTRONIC M & M                         | 7-40                  | 6 1/2       | -1 1/2             | -1 1/2        | -18 1/4               | -18 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D FAIRCHILD                                | 3-8                   | 3 1/2       | 0                  | 0             | -12 1/2               | -12 1/2     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O FAIRCHILD MFG.                           | 2-17                  | 2 1/4       | 0                  | 0             | -4 1/4                | -4 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D INFORMATION DISPLAYS                     | 6-20                  | 6           | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A MARSHALL INDUSTRIES                      | 4-17                  | 14 1/4      | -1 1/4             | -1 1/4        | -10 1/4               | -10 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A MILD ELECTRONICS                         | 15-84                 | 19 1/2      | -1 1/4             | -1 1/4        | -8 1/4                | -8 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U MINIMA DATA SCI                          | 15-87                 | 18 1/4      | -1 1/4             | -1 1/4        | -9 1/4                | -9 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O OPTICAL SCANNING                         | 14-52                 | 13 1/2      | -3 1/2             | -3 1/2        | -20 1/4               | -20 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D PHOTON                                   | 14-52                 | 13 1/2      | -3 1/2             | -3 1/2        | -20 1/4               | -20 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D PHOTO-MAGNETIC SYS.                      | 1-1                   | 1 1/4       | 0                  | 0             | -9 1/4                | -9 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A PIONEER INSTRUMENT                       | 15-82                 | 16 1/2      | -1                 | -1            | -5 1/4                | -5 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U PRECISION INST.                          | 7-25                  | 9 1/2       | -1 1/4             | -1 1/4        | -2 1/4                | -2 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U RECOGNITION EQUIP                        | 4-15                  | 4 1/2       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U RECOR CORP.                              | 4-15                  | 4 1/2       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| N SANGERS ASSOCIATES                       | 7-29                  | 9           | 0                  | 0             | -7 1/4                | -7 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| U SCAN DATA                                | 7-25                  | 7 1/2       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A TALLY CORP.                              | 11-25                 | 11 1/4      | 0                  | 0             | 0                     | 0           |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H TEXEL                                    | 11-25                 | 11 1/4      | 0                  | 0             | 0                     | 0           |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| D VIATRASH                                 | 5-13                  | 5 1/4       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| SUPPLIES & ACCESSORIES                     |                       |             |                    |               |                       |             |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| N ADAMS-MILLIS CORP.                       | 8-15                  | 10          | 0                  | 0             | -7 1/4                | -7 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O BALTIMORE BUS FORMS                      | 11-21                 | 11 1/2      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A BARRY WRIGHT                             | 6-25                  | 7 1/2       | 0                  | 0             | -10 1/4               | -10 1/4     |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A DATA DOCUMENTS                           | 4-15                  | 4 1/2       | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H ENNIS BUS. FORMS                         | 11-19                 | 11 1/2      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O GRAPHIC CONTROLS                         | 7-17                  | 7           | 0                  | 0             | -9 1/4                | -9 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H HENKON                                   | 18-160                | 162 1/4     | -1 1/4             | -1 1/4        | -2 1/4                | -2 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| N J                                        | 71-114                | 82 1/4      | +1 1/2             | +1 1/2        | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H JONES BUS. FORMS                         | 11-19                 | 11 1/2      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| N MASUDA CORP.                             | 21-45                 | 28          | -1 1/2             | -1 1/2        | -5 1/4                | -5 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O REYNOLDS & REYNOLD                       | 25-48                 | 30 1/2      | 0                  | 0             | 0                     | 0           |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| O STANDARD REGISTER                        | 20-30                 | 19 1/4      | -1 1/2             | -1 1/2        | -7 1/4                | -7 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A STANLEY                                  | 11-25                 | 11 1/4      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| A STANLEY MAGNETICS                        | 8-10                  | 8 1/2       | 0                  | 0             | -6 1/4                | -6 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| H WALLACE FORMS                            | 11-25                 | 11 1/4      | 0                  | 0             | -1 1/4                | -1 1/4      |                                                                                                                                                                                 |                       |             |                    |         |  |  |
| DATE FOR EACH TRADING ISSUE: 100 or 37/100 |                       |             |                    |               |                       |             |                                                                                                                                                                                 |                       |             |                    |         |  |  |

# Why is Epoch 4 guaranteed for only 20 years?



**Our lawyers wouldn't  
let us say "forever."**

We figure a 20-year warranty will make our point, even if we can't legally say "forever." *Epoch 4's new coating is so tough, so flexible and resilient, that it withstands the kind of handling that would instantly kill a conventional computer tape.*

Put another way, Epoch 4's new coating is 8000% tougher than the

best competitive products on the market.

We're serious about the 20-year warranty. Because we're serious about Epoch 4's fantastic performance.

Isn't it time you got serious about eliminating dropouts? Isn't it time you got serious about Epoch 4?

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